SHARING FOREIGN TECHNOLOGY: SHOULD WE PICK THEIR BRAINS?

HEARING

BEFORE THE

SUBCOMMITTEE ON INTERNATIONAL SCIENTIFIC COOPERATION

OF THE

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY U.S. HOUSE OF REPRESENTATIVES

ONE HUNDREDTH CONGRESS

SECOND SESSION

APRIL 27, 1988

[No. 149]

Printed for the use of the
Committee on Science, Space, and Technology

U.S. GOVERNMENT PRINTING OFFICE

87-536 WASHINGTON : 1989

For sale by the Superintendent of Documents, Congressional Sales Office
U.S. Government Printing Office, Washington, DC 20402

H701-40

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

ROBERT A. ROE, New Jersey, *Chairman*

GEORGE E. BROWN, JR., California
JAMES H. SCHEUER, New York
MARILYN LLOYD, Tennessee
DOUG WALGREN, Pennsylvania
DAN GLICKMAN, Kansas
HAROLD L. VOLKMER, Missouri
BILL NELSON, Florida
RALPH M. HALL, Texas
DAVE McCURDY, Oklahoma
NORMAN Y. MINETA, California
BUDDY MacKAY, Florida
TIM VALENTINE, North Carolina
ROBERT G. TORRICELLI, New Jersey
RICK BOUCHER, Virginia
TERRY L. BRUCE, Illinois
RICHARD H. STALLINGS, Idaho
JAMES A. TRAFICANT, JR., Ohio
JIM CHAPMAN, Texas
LEE H. HAMILTON, Indiana
HENRY J. NOWAK, New York
CARL C. PERKINS, Kentucky
C. THOMAS McMILLEN, Maryland
DAVID E. PRICE, North Carolina
DAVID R. NAGLE, Iowa
JIMMY HAYES, Louisiana
DAVID E. SKAGGS, Colorado
PAUL E. KANJORSKI, Pennsylvania
GEORGE J. HOCHBRUECKNER, New York

MANUEL LUJAN, JR., New Mexico*
ROBERT S. WALKER, Pennsylvania
F. JAMES SENSENBRENNER, JR., Wisconsin
CLAUDINE SCHNEIDER, Rhode Island
SHERWOOD L. BOEHLERT, New York
TOM LEWIS, Florida
DON RITTER, Pennsylvania
SID MORRISON, Washington
RON PACKARD, California
ROBERT C. SMITH, New Hampshire
PAUL B. HENRY, Michigan
HARRIS W. FAWELL, Illinois
D. FRENCH SLAUGHTER, JR., Virginia
LAMAR SMITH, Texas
ERNEST L. KONNYU, California
JACK BUECHNER, Missouri
JOEL HEFLEY, Colorado
CONSTANCE A. MORELLA, Maryland
CHRISTOPHER SHAYS, Connecticut

HAROLD P. HANSON, *Executive Director*
ROBERT C. KETCHAM, *General Counsel*
CAROLYN C. GREENFELD, *Chief Clerk*
R. THOMAS WEIMER, *Republican Staff Director*

SUBCOMMITTEE ON INTERNATIONAL SCIENTIFIC COOPERATION

RALPH M. HALL, Texas, *Chairman*

MARILYN LLOYD, Tennessee
BUDDY MacKAY, Florida
ROBERT G. TORRICELLI, New Jersey
RICHARD H. STALLINGS, Idaho
JAMES H. SCHEUER, New York

F. JAMES SENSENBRENNER, JR., Wisconsin
SHERWOOD L. BOEHLERT, New York
RON PACKARD, California
HARRIS W. FAWELL, Illinois

---

*Ranking Republican Member.

CONTENTS

WITNESSES

April 27, 1988: Page

Hon. John D. Rockefeller IV, a U.S. Senator from the State of West Virginia 3

Dr. Christopher T. Hill, Senior Specialist, Science and Technology Policy, Congressional Research Service, Library of Congress 7

Dr. Rustum Roy, Materials Research Laboratory, Pennsylvania State University; Ora. E. Smith, Director, External Technical Development, Rockwell International Corp.; Dr. Justin L. Bloom, former Science Counselor, U.S. Embassy in Tokyo; Tom Satoh, President, T. Satoh & Co 27

APPENDIX I

Additional Statements for the Record

Hon. Richard J. Smith, Acting Assistant Secretary, Bureau of Oceans and International Environmental and Scientific Affairs, Department of State 81

Charles T. Owens, Head, Information and Analysis Section, Division of International Programs, National Science Foundation 86

Hon. Barry C. Beringer, Associate Under Secretary for Economic Affairs, Department of Commerce 100

APPENDIX II

Additional Questions and Answers for the Record

Dr. Christopher Hill, Senior Specialist, Science and Technology Policy, Congressional Research Service 108

Prof. Rustum Roy, Materials Research Laboratory, the Pennsylvania State University 114

Dr. Justin L. Bloom, President, Technology International, Inc 118

Ora E. Smith, Director, External Technical Development, Rockwell International Corp 126

Tomoyuki Satoh, President, T. Satoh & Co., Inc 132

Hon. Barry C. Beringer, Associate Under Secretary for Economic Affairs, Department of Commerce 139

Hon. Richard J. Smith, Acting Assistant Secretary, Bureau of Oceans and International Environmental and Scientific Affairs, Department of State 149

Charles T. Owens, Head, Information and Analysis Section, National Science Foundation 190

APPENDIX III

Additional Materials for the Record

Report on Federal Government activities to obtain, translate, abstract, and disseminate Japanese technical literature, prepared by Commerce Department Office of Japanese Technical Literature 204

SHARING FOREIGN TECHNOLOGY: SHOULD WE PICK THEIR BRAINS?

WEDNESDAY, APRIL 27, 1988

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
SUBCOMMITTEE ON INTERNATIONAL SCIENTIFIC COOPERATION,
Washington, DC.

The subcommittee met, pursuant to notice, at 2:05 p.m., in room 2318, Rayburn House Office Building, Hon. Ralph M. Hall (chairman of the subcommittee), presiding.

Mr. HALL. The Subcommittee on International Scientific Cooperation will come to order, and of course I would like to welcome everyone to today's hearing, which will consider U.S. demand for foreign scientific and technical information and possible mechanisms beyond those already mandated by law to improve the sharing of foreign technology.

We are especially honored today to have Senator Jay Rockefeller on our panel of witnesses. He has demonstrated continuing leadership on this issue of foreign technology and we're pleased that he could take the time out of his very busy schedule to appear at today's hearing.

We have scheduled this hearing because of recent warning signs that the U.S. may be losing its technological edge in the global marketplace. Evidence of this change in our historical advantage ranges from the number and quality of patents granted to foreigners to percentage of foreigners in advanced science and engineering programs in U.S. universities and research labs, and even to the relative share of articles authored by foreigners in scientific and technical journals.

Now this situation has serious implications for America's competitiveness in the coming decades, given the linkage between a nation's excellence in science and technology and its economic growth and competitiveness.

The Japanese and others have benefited in large part from availing themselves of the vast amounts of scientific and technical information that emanate from the U.S. research labs and universities, but we've not really exhibited a reciprocal interest in foreign technological developments.

Some probably would argue that foreign access to U.S. scientific and technical developments undermines our competitiveness, that foreign interests will apply our developments in their own products and processes and confront us in the world markets with technology that was initiated here.

To others, however, the exchange of technical information across national boundaries is a boon for all participants. Valuable information developed outside the United States could provide advantages to U.S. competitiveness by short-cutting our own R&D processes, by leapfrogging to more advanced innovations and ultimately shedding new light on materials, processes, products and productivity improvements.

The fact is that technology has become internationalized and if we ignore developments beyond our borders, an information gap in this country is very likely to result.

Unfortunately, however, resistance remains very strong to the notion that other countries may have something to teach us on the technology front. The role of the Federal Government in correcting this imbalance in the flow of technology is very clear. As the Office of Technology Assessment concluded in its recent report on International Competitiveness and Services, "Federal policies that encouraged inflows of foreign technology could help support the long term competitiveness of many U.S. industries."

Small steps have already been taken to redress the uneven flow of technical information. In 1986, Congress passed the Japanese Technical Literature Act to increase the availability of Japanese technical literature in the United States. In the last year, the President signed Executive Order No. 12591, which among other things directs the Secretaries of State and Commerce and the Director of the National Science Foundation to develop a central mechanism for disseminating foreign S&T information.

But these are small programs which have yet to receive substantial Federal funding, so the focus of today's hearing will be whether mechanisms beyond those currently mandated by law might expand the exchange of foreign technical information and improve U.S. competitiveness.

Several programs of this sort are described in Dr. Hill's papers and will be addressed by the witnesses. At the conclusion of the hearings, we hope to have a clearer picture of the role of foreign technical information for our future technological development and the policy options that the Federal Government might pursue to provide more utility for this critical component of U.S. competitiveness.

So at this time, before we recognize Senator Rockefeller, I recognize Congressman Boehlert of New York for an opening statement.

Mr. BOEHLERT. Thank you, Mr. Chairman. I don't have an opening statement, but I want to commend you for having this important hearing today. I think we all have to recognize that Washington is not the source of all wisdom, nor is the United States of America. We have much to learn from having the access we desire to foreign technical information.

I am impressed by the distinguished list of witnesses we will have before us today, and I am particularly happy to welcome our colleague, Senator Rockefeller, as the first witness, because in the spirit of bipartisanship I want the world to know that we are very proud of the work you are doing and glad to identify with it, Senator.

Mr. HALL. I recognize Congressman Packard from California for an opening statement.

Mr. PACKARD. Thank you, Mr. Chairman. I have no opening statement.

Mr. HALL. All right. At this time we are honored to recognize Senator Jay Rockefeller, who is the Senator from West Virginia, as most of us know, and the father of the Japanese Technical Literature Act, the leader in that field, certainly a leader in the field of accessing foreign scientific and technical information. It is good to have you. Welcome over to this side. We recognize you at this time, Senator.

STATEMENT OF HON. JOHN D. ROCKEFELLER IV, U.S. SENATOR FROM THE STATE OF WEST VIRGINIA

Senator ROCKEFELLER. Thank you, Mr. Chairman. Thank you so very much. I am very honored to be here and I am very honored to be with Congressman Boehlert. He was good enough to allow me to put my name behind his on a bill that he in fact created and I think is doing some good for this country and to be with Congressman Packard also.

The United States for decades has just unquestionably been the world's number one source of scientific and technological advances, but the world has changed a lot and the relative power, the relative wealth and scientific capability of many other countries has improved, and that is as it should be and it is quite natural.

The technology of Japan, in particular, of course makes it a global powerhouse. Although I will focus on Japan this morning, much of what I will say can be applied to other countries as well. I will talk mainly about Japan today because that country represents both the greatest source of competition for our country in the 21st Century, and, Mr. Chairman, also our greatest potential source of economic, scientific and technological cooperation. We can pick. We can fight or we can cooperate. If we manage this relationship wisely with Japan, as I believe we can, the entire world can benefit.

Mr. Chairman, by some measures Japan is ahead of the United States in a number of cutting edge areas such as robotics, ceramics, processing, numerically controlled technology, and we always hear that. In many other areas, however, the United States still has a good and substantial lead: fiber optics, biotechnology, software development. Japan has learned an enormous amount from the United States and our laboratories and our learned people over the years, and now there is much that we can learn from Japan. It is of vital importance to this country that the flow of technology between the United States and Japan becomes more equitable and more balanced.

During the recently concluded negotiations on the U.S.-Japan Science and Technology Agreement, my major concern centered on the access that researchers in Japan and the United States have to each other's laboratories. U.S. Government labs, as is well known, are open, always have been, probably always will be to foreign researchers.

For example, there are some 400 Japanese scientists at the National Institute of Health right now and we pay the tab on that and there is no problem. That's fine. They learn what they learn

and either stay here or go home. For the most part, they go home, but that's openness and fairness.

The same condition, however, does not necessarily exist in Japan, and the result is that there is a substantial imbalance between the number of American researchers in Japan and the number of Japanese researchers in the United States.

Now there are many reasons for this, including a very different laboratory system structure in Japan, an environment where there is less independence for junior research scientists, the fact that few non-Japanese speak Japanese, and very different living conditions and customs in that country. The biggest problem, however, has been the absence of commitment of that government in Japan to get their laboratories to open up to foreign researchers, not just ours but others.

We seem to have gotten over this hurdle in the new agreement. We may have gotten over this hurdle in the new Science and Technology Agreement, and I think we should be pleased about that. I think there are going to be some changes. Now the challenge will be to assure that what is in the agreement will in fact be implemented by Japanese government agencies and that American researchers on our side, our researchers, make the effort to get into those laboratories. There is a real obligation on both sides to see that this agreement in fact works.

Another serious issue relates to our inability, Mr. Chairman, thus far to take advantage of something that you discussed a moment ago, and that is published Japanese technical and scientific research. As you are very well aware, for decades the Japanese have been reading everything we put out that is non-classified. That is as it should be. We are that kind of country. We tend to be open. We tend to welcome other people to come, and it seemed that we had a superiority of technology in our knowledge so it made sense that other people would come and learn from us.

The problem, though, is that now for a number of years the Japanese have been putting out some 10,000 journals themselves, and they are full, replete with the learning that is going on in Japan, the research that is going on in Japan at all levels. It is available. It is in Japanese. So how much do we read? Maybe of those 10,000, a hundred or 200 articles. Now that is absolutely, fundamentally not the fault of the Japanese. That's our fault. Can't blame that on the Japanese. You have to blame that on our system, on our decision-making.

That is why I introduced the bill that you referred to, Mr. Chairman, the Japanese Technical Literature Act, in the 99th Congress, which created the Japanese Translation Office in the Department of Commerce. Now this was not something to shake the Western world or the Eastern world. It was simply an effort to make a statement that there is knowledge in those technological journals and articles which our researchers, our business, our Government, our academic people ought to have available to them, and that it was not being sufficiently translated. Therefore they weren't able to get at it—so, let's translate it and start the process.

The Federal Government, in my judgment, has a vital role to play in helping American industry to understand that they do in fact need scientific and technical information originating abroad,

and certainly from Japan. The job of the Japanese Translation Office is to seed this process, to make American business aware of the importance of Japanese technical literature.

Now that should not be a statement that we should have to make. American business, much more than the Federal Government, ought to be aware of where they are losing out in terms of research, of opportunities. American industry is meant to be hungry, entrepreneurially hungry for opportunities, for new wisdom, new knowledge. Unfortunately, however, Mr. Chairman, we confront a syndrome in this country known as NIH, and it is not the National Institute of Health that I was talking about. It is something called "Not Invented Here," and that represents to this Senator the height of dangerous arrogance and naivete.

It indicates a belief on our part that scientific and technological knowledge in the United States is so far beyond that which exists elsewhere in the world that we have nothing to learn from foreign scientists. One would think that a $170 billion global trade deficit might indicate otherwise, and a $60 billion deficit bilaterally with Japan would indicate otherwise, and that NIH-type thinking, that is "Not Invented Here" type thinking, would be out of place. Regrettably, this does not appear to be the case.

Now I have been, to be honest with the Chairman, quite shocked in a number of instances where I have met with representatives of major American corporations and mid-sized American corporations where they are involved in high tech and they basically feel they have nothing to learn from the Japanese and they so say. I remember at a breakfast recently sitting with a representative of a very large industry, high tech industry, in this country, doing a lot of research, and the person simply told me we have nothing to learn from the Japanese. We are not interested in the Japanese translation. We are not interested in translated literature. We feel we have what we need. Several days later I talked with the CEO of that same company and he told me that there was very much to learn from Japan, and indeed he is right. But obviously this CEO is facing an American cultural problem, and that is getting the message down to the people in this company.

To make matters worse, the Department of Commerce does not seem to have taken the Japanese Translation Office very seriously. The office has missed deadlines on a number of occasions. It has given limited staffing and an inadequate budget to this bill. I consider that a tragedy, and I hope that new leadership at the Department of Commerce will change that.

Recently I received some more distressing news, and you will be hearing more about that later on—that the major source of English translations of Japanese science and technical literature in this country is closing its doors—I mean truly distressing news. The Japanese Technical Information Service, run by University Microfilms, is shutting down because "the market isn't big enough." Now I don't criticize University Microfilms. They have got to stay in business. They have got to have customers to make a profit to pay people to translate. This demonstrates the importance of a Federal Government not being intrusive but somehow establishing a role in getting this process started and continuing with the process.

I understand that Tom Satoh, who is going to be one of your later witnesses, ran that Japanese Technical Information Service. I would give anything, Mr. Chairman, to be here and hear his remarks, and I hope that I will be able to get hold of them.

Mr. HALL. We'll make sure you get a copy.

Senator ROCKEFELLER. I'd appreciate that, sir, very, very much.

I will say this, that there are, through no particular effort of the American Government, there are a lot more young Americans studying Japanese, and there are a lot more young Americans going to Japan and studying it there, becoming proficient, and there are a lot of them being employed by Japanese companies. Our companies seem to be reluctant to employ them with their Japanese language skills, and I don't know the reason for that, but I find that regrettable.

Mr. Chairman, technology flow is not a game. It is our future. There are many challenges that we have to meet on our own that have nothing to do with technology, and we all know that. We have to improve our scientific and mathematical skills and the orientation of senior management away from finance towards production. We need top corporate officials with an understanding of science and technology. The Japanese CEO's tend to be people in the sciences and engineering. Our CEO's in this country tend to be people who come from lawyers or marketing or public relations. That describes a fundamental difference of approach. And we must improve our ability to commercialize our own discoveries.

In conclusion, Mr. Chairman, I must say that it is very revealing every time that I go to Korea, not Japan but Korea, and meet with a chairman of a major Korean corporation and learn that not only does he have a Ph.D. in Chemical Engineering from a major American university but that he has two sons, both of whom are in Ph.D. programs in the United States in engineering. I mean in Taiwan, Japan, and Korea they take engineering seriously, as they take education seriously. Young people learning technology today, Mr. Chairman, are tomorrow's trade statistics. It is exactly what it comes down to, and we better wake up to that fact. A vital component of this learning process is to take advantage of the scientific and technological developments going on throughout this world.

I want to thank Chairman Hall for his courtesy in allowing me to appear on this very, very important subject. I am very grateful to you, sir.

Mr. HALL. We certainly thank you. I think it is obvious that you have much bipartisan admiration and respect for your leadership in this field and there are a lot of things that all of us would like to talk with you about and perhaps we'll arrange a breakfast or something later for you to impart more of your knowledge to this Committee, because we are truly interested in solving and approaching and probing the pattern that you have already set, and for that we are thankful.

I have about three minutes to go vote on a very important issue, and we will stand recessed for about ten minutes. Thank you again, Senator.

Senator ROCKEFELLER. Thank you.

[Brief recess.]

Mr. HALL. We will commence again and the Chair is pleased to recognize Dr. Christopher Hill, Senior Specialist in Science and Technology Policy for the Congressional Research Service, and author of Japanese Technical Information: Opportunities to Improve U.S. Access, October 13, 1987, for which we congratulate you and thank you.

Dr. Hill, we recognize you at this time.

STATEMENT OF DR. CHRISTOPHER T. HILL, SENIOR SPECIALIST, SCIENCE AND TECHNOLOGY POLICY, CONGRESSIONAL RESEARCH SERVICE, LIBRARY OF CONGRESS

Dr. HILL. Thank you, Mr. Chairman. It's my pleasure to respond to the Subcommittee's request that I be here today.

With your permission, I'll summarize my written remarks.

Mr. HALL. Please do, without objection.

Dr. HILL. This testimony, as you so kindly pointed out, will be based largely on a CRS report that I completed last fall at the request of Senator Rockefeller on opportunities to improve U.S. access to Japanese technical information.

It also draws on a report done by my colleague, Nancy Miller, on a similar subject. The Subcommittee has already received copies of both of those reports, I believe.

The major points I make in my report are the following. First, that engineers, scientists, and research managers always have to decide what fractions of available time and money should be spent on original research and development, and what fractions should be spent on finding out what's already been learned by someone else, someplace else.

The government faces the same kind of choice. How much to support original research and how much to support the acquisition, interpretation, and dissemination of technical knowledge obtained elsewhere.

I also point out in the report that important work on the frontiers of both science and technology is now being done in laboratories around the world, and to stay abreast of the latest developments, it's no longer enough just to read the English language literature.

We also have to be aware of works published in all sorts of unusual and difficult languages like Chinese, and Japanese, and Korean, and Russian.

Japan, for example, is generating an important body of new scientific and technical knowledge. The major problem, as Senator Rockefeller has already pointed out, in achieving effective access to this information is not that Japan is unwilling to share it with Americans, but that America is either not willing or not prepared to take the actions necessary to acquire it and disseminate it in a timely and effective manner.

Industry and government are working to increase the flow of technical information from Japan to the U.S. But the increase in supply in recent years has not been matched by commensurate increase in demand for, or use of, the available information.

So, several rationales have been offered for an active Federal Government role in increasing access to foreign technical information.

One is simply that such information is needed for the government's own purposes in carrying out its missions in areas like space, defense, and weather forecasting.

Another rationale is that only the government can effectively negotiate with foreign governments for access to information from their government-coordinated R&D programs, and their technical information and technology transfer efforts.

Yet, another rationale is that the free market, acting on its own, is unlikely to provide the socially or economically optimum level of access to foreign technical information in the private sector. Spillover benefits accrue to everyone from the collection of foreign technical information, and their value often cannot be captured by the firm that pays for it.

Furthermore, potential buyers of information are often not certain about its value until they've had a look at it. But once they've had a look at it, they've lost the incentive to pay for it. Both of these, what are called in technical terms market failures, can be barriers to effective private provision of foreign technical information services.

And the fourth rationale is that providing such information through Federal efforts may improve the carrying out of research and development in universities and industry.

Let me just explain this for a moment. One of the effects of Federal funding of research and development since World War II in universities has been to put more and more emphasis on basic disciplinary research—on the search for new knowledge, on the drive for tenure, on the need to publish or perish.

One of the arguments, then, for the Federal Government providing some assistance to universities to get involved in the business of foreign technical information is to provide an opportunity for professors to go the department head and say, I'd like to spend a year in Japan learning what they do so we can do our research better. Right now, that's a negative in the university because of the way we run our Federal R&D programs. We ought to try to make it a positive.

But on the other hand, there are also rationales against an effective Federal role. For one thing, even if there are market failures like the ones I've just mentioned, the ability of the government to address them is also limited. Like markets, I don't have to tell you government itself is not perfect. Second, copyright and trade secret protection as well as the benefits of early access to information do make it worthwhile for firms to buy foreign technical intelligence. And lots of people in Washington and New York and Tokyo and other places make a good living doing that job today.

But large firms are typically in a much better position to make such investments than are the small ones. Furthermore, companies are not always without power in the face of foreign government barriers, and information sharing with foreign companies can often be tied into international joint ventures, or into overseas investments in marketing, production, or research.

And finally, to meet its own needs for technical information, the government always has the option of hiring private contractors to help provide it.

We can think about a series of steps in accessing foreign scientific and technical information, including assuring the legal rights of access, selection, acquisition, translation, dissemination, interpretation, and analysis of information, and evaluating the procedures for getting it.

Now, it's not always clear just which of these functions government can best do or which of them government needs to be involved in. But let me offer you a few observations today from our report.

First, legal barriers in Japan have not been a major limiting factor in getting access to technical information. But, there's growing evidence that the reach and the complexity of Japanese copyright law may be a problem that we need to address head-on and directly.

In addition, the growing tendency in the United States to put restrictions on foreign access to our own technical information in order to protect international competitiveness may give us problems in the future in negotiating for access to other people's information.

We also point out that the volume of Japanese technical information is very large. It would be very wasteful, in fact, quite impossible to acquire, translate or disseminate all of this information to U.S. researchers.

Therefore, we have to select the very best and most important and this should occur before we try to translate things if at all possible, because it's the translation step that's the most expensive and where there are the fewest qualified people to carry it out.

Some have asked, why not do this by computer? While a machine-aided translation of Japanese to English is still experimental, and while the Japanese apparently lead U.S. efforts in that regard, it still typically only works after careful tailoring to a specific type of literature and after careful pre-editing and post-editing by a skilled translator.

For the forseeable future, firsthand observation and discussion of Japanese research and technology, research and development, science and technology, by American experts who visit Japan is likely to remain the most effective approach to remaining abreast of current developments.

However, few American scientists and engineers have the financial resources to go over there, or the in-country contacts to be able to arrange such visits and report on them without some kind of support.

Well, our government has become increasingly involved in accessing Japanese technical information with varying degrees of understanding and enthusiasm, and with typically limited financial resources. The Departments of Commerce, Energy, and Defense, NSF, NASA, and the intelligence community, and I add here our own Library of Congress, are involved in that work.

But there are plenty of opportunities for improvement. No one knows how much money the Federal Government ought to spend

on this process, and it's unlikely that the economists are really going to be able give us any clear answers.

But relative to the amounts of Federal money we spend on original research and development, about $61 billion this year, the current level of spending, which is only a few million, seems low.

For example, the new Office of Japanese Technical Information in Commerce has been able to fund only two or three special studies of the sort called for under its enabling legislation, whereas, *one could easily imagine doing dozens, or even hundreds, of such* studies with good effect.

But, again, we have to point out that there is considerable uncertainty about the demand for technical information from Japan.

Either more needs to be done to stimulate the demand for the information, or vendors like the Japan Technical Information Service had not yet found the right product.

Either the information is not being made available in a useful form or at the right price, or we need some more time to convince potential users of its value.

I want to mention the National Science Foundation's new programs in which they've become more active in helping American scientists and engineers travel and work in Japan.

Some of those programs last a few weeks, and some of them are good for as long as three years. Some of the opportunities reflect Japan's new openness to foreign technical visitors, and we should note that some are even being paid for by Japanese interests.

Let me turn to some of the other Federal options that might help solve this problem. There's a lot more detail on each option in my report, and I won't give all of it here.

Where I'll mention costs, I should say, they're indicative of the range of costs; they're certainly not definitive.

First, the Federal Government could subscribe to all the Japanese technical journals, and because of the copyright limitation, it would only be able to make them available in the original.

People would have to go somewhere and read them since we're not able to work out general copyright arrangements to allow us to make copies.

This might cost $1 million a year, roughly speaking, if we subscribe to everything that Japan is producing. The government could arrange for translation into English of all of those 10,000 journals published in Japan.

I estimate this might cost $80 million a year, but we don't have enough people in this country who understand both English, Japanese, and science or engineering, to be able to do that job.

The government could subsidize more short term travel to Japan by American scientists and engineers who, in return, would have to report widely on their observations.

Sending 1,000 people a year wouldn't be unreasonable, and if we paid their full costs, that might cost $10 million. The Federal Agency could publish what I call the Journal of Trip Reports, that would publish summaries of overseas technical visits by Americans, whether supported by the government or not.

Editing and producing a journal might cost on the order of $300,000 a year, and we might be able to get that money back on subscription fees.

NSF might offer graduate fellowships for the combined study of Japanese and science and engineering. Now, it takes a rare bird to commit the amount of resources that it takes to study both science and engineering and Japanese. That's not an easy task. It might take up to five years to get a Ph.D. and reasonable fluency in Japanese, including spending some time over there. If we had 100 new fellows a year in a program like that, and we paid them a reasonable stipend, it might cost $6 million a year.

A Federal agency might support senior fellowships for study in Japan for established senior scientists and engineers. A program involving 100 senior fellows might cost us $5 million a year. You have to pay them a little bit more. The existing Federal presence in Japan of NSF and the Office of Naval Research could be augmented by putting, say, 20 more scientists and engineers over there on a rotating basis, which might cost $4.5 million a year to do.

To help offset the high startup costs of the private and professional society efforts to translate, abstract, and disseminate Japanese technical information, subsidies of limited scope and limited duration might be offered.

Depending on how many of them you did, it might be reasonable to spend $3.5 million a year on them. You could give tax incentives to private firms to help them offset their own costs.

The rationale for a tax incentive would be that if Company A goes to the trouble of translating and acquiring Japanese information, it often finds its way into the hands of Companies B, C, and D, so that there becomes a cooperative public interest in helping pay for that.

I have no idea how much that might cost. In my report I estimated that a tax credit of 50 percent of qualifying expenditures might cost $50 million a year in foregone revenue. But that's a wild guess. We really don't know what that would cost.

The NTIS might sponsor conferences and training programs, just to help researchers in industry and elsewhere learn how to access and use foreign technical information, at a cost of, say, $400,000 a year.

Grants and contracts could be awarded to universities, non-profit research centers, or industry to develop—help develop—machine-aided translation methods, at a cost of, say, $10 million a year.

And finally, NSF's Japanese Technology Evaluation Program, known as JTECH, might be funded to study 20 fields a year instead of the one or two a year that they're currently able to do, and that would cost a couple of million dollars.

Well, these options don't exhaust all the opportunities to improve the situation. But with the exception of tax incentives and wholesale translation, most are relatively modest in cost.

Now, I know you hear every day, Mr. Chairman, that programs are modest in cost, so I don't want to claim too much modesty for these either.

It's difficult to—but a total of $25 million a year spent in this area does not seem entirely unreasonable and doesn't seem—and could do a lot to make the information more available than it is today.

It's difficult to quantify the benefits of doing this, but if they made it unnecessary to spend just 0.02 percent, that's two parts in

ten thousand of our Federal R&D budget—of our national R&D budget, they would be cost effective.

But it's not clear which option would make a significant difference to U.S. technical performance, and there would be real costs, either in terms of additional Federal spending, or in terms of the displacement of current R&D funding.

And in view of these uncertainties in demand and uncertainties in costs, and uncertainties in effectiveness, I would certainly encourage you to continue to examine carefully and monitor whatever commitments are made now and in the future. Thank you and I'll be pleased to answer any questions you have.

[The prepared statement of Dr. Hill follows:]

Congressional Research Service
The Library of Congress

Washington, D.C. 20540

TESTIMONY

of

Christopher T. Hill
Senior Specialist
Science and Technology Policy
Congressional Research Service
Library of Congress

at the request of the

Subcommittee on International Scientific Cooperation
Committee on Science, Space, and Technology
U.S. House of Representatives

April 27, 1988

Mr. Chairman and Members of the Committee. It is my pleasure to respond to your request for testimony regarding "...foreign technical information and its link to competitiveness," and "...the utility of foreign scientific and technical information for U.S. scientists and engineers, and the program options for further Federal Government action."

This testimony is based largely on a CRS report I completed last fall at the request of Senator Rockefeller on opportunities to improve U.S. access to Japanese technical information.[1] It also draws on an earlier CRS report by my colleague, Nancy R. Miller, also performed in response to Senator Rockefeller's request.[2] The Subcommittee has already received copies of these two reports.

In addition, CRS has tracked recent activities by the Department of Commerce, the National Science Foundation, and the Department of State, among others, to improve access to foreign technical information pursuant to the Japanese Technical Literature Act of 1986 (P.L.99-382), the Federal Technology Transfer Act of 1986 (P.L.99-502), and Presidential Executive Order 12591 of April 10, 1987, "Facilitating Access to Science and Technology."

A Framework for Considering the Federal Role in Information Access

Today I will summarize the major ideas in the CRS report I prepared last fall. In summary, the major points of the report are the following:

-- Engineers, scientists, and technical managers always face a strategic decision: what fractions of available time and money should be spent on original research and development, and what fractions should should be spent on finding out what has already been done by someone else.

---

[1] Christopher T. Hill, Japanese Technical Information: Opportunities to Improve U.S. Access, CRS Report for Congress, 87-818S, October 13, 1987.

[2] Nancy R. Miller, Japanese Science and Technology: Some Recent Efforts to Improve U.S. Monitoring, CRS Report No. 86-195SPR, December 23, 1986.

-- In supporting science and technology development, the Government faces the same kind of choice: what fraction of support should support original research, and what fraction should support the acquisition, interpretation, and dissemination of knowledge developed elsewhere.

-- Important work on the frontiers of both science and technology is now being done in laboratories all around the world, and to stay abreast of the latest developments, it is no longer sufficient for an American to read the English language scientific and technical literature. We must also be aware of works published in difficult and, for most Americans, esoteric languages such as Japanese, Korean, Chinese, and Russian.

-- From the point of view of international economic competition, it is now widely agreed that Japan is generating an important body of new scientific and technical knowledge. It is also agreed that the major problem in achieving effective access to this information is not that Japan is unwilling to share it with Americans, but that America is either not willing or not prepared to take the actions needed to acquire and disseminate it in a timely and effective manner.

-- A number of steps have been taken by both industry and the Federal Government to increase the flow of technical information from Japan to the United States. The increase in supply in recent years has not, in the judgment of many informed observers, been matched by a commensurate increase in demand for and utilization of the available information.

-- Several rationales have been offered for an active Federal role in increasing access to foreign technical information. One is that such information is essential to the effective execution of many of the Government's own missions in such areas as defense, space, weather forecasting, and procurement.

CRS-3

-- A second rationale for a Federal role lies in the fact that only the Government has the power to negotiate effectively with foreign governments for the release of information about, and for equitable participation by American companies in, foreign-government coordinated R&D and technical information programs.

-- A third rationale for a Federal role is that certain "market failures" mean that the free market acting on its own is unlikely to provide the socially and economically optimum level of access to foreign technical information for private firms. These "market failures" include the spill-over" benefits that accrue to everyone from the collection of foreign technical information, and whose value cannot be totally captured by the firm that pays for the collection. Another market failure arises from the fact that any potential buyer of information is uncertain about its value until he has had access to it, at which point he no longer needs to pay for it. Both of these market failures can be barriers to effective private provision of foreign technical information services.

-- A fourth rationale for Federal involvement in gathering foreign technical information is that it may improve the efficiency of existing government programs that support performance of R&D in universities and industry.

-- On the other hand, there are also rationales against an active Federal role. For one thing, even if the market failures mentioned above are real and important, the ability of the government to address them constructively may also be limited.

-- Second, even if market failure exists, the fact that some modes of gathering and delivering information from overseas underlie a large and growing business activity in the United States suggests that under at least some circumstances, such factors as copyright and trade secret protection, as well

as early access to knowledge, make it worthwhile for firms to invest heavily in foreign technical intelligence. Large firms are typically in a better position to make such investments than smaller ones.

-- Furthermore, firms that wish to access foreign technical information are not always powerless to overcome foreign government barriers. Information sharing can be tied into international joint ventures and into overseas investments in marketing, production, or R&D.

-- Finally, to meet its own mission needs for foreign technical information, the Government can always use private contractors to gather it, rather than mounting its own access programs.

Stages in the Information Access Process

It is useful to conceive of access to foreign scientific and technical information in terms of a series of steps or stages. These steps, which do not always fall in exactly this order, include the following:

assuring legal rights of access to information
selecting relevant information to acquire
acquiring the selected information
translating the information
disseminating the information
interpreting and analyzing the information
evaluating access procedures and performance.

There is not time today to discuss each of these stages or the proper role of government in each of them. I would refer you to the CRS report for more detail. Here, only a few salient observations are summarized:

-- Legal barriers have not been a limiting factor in assuring access to technical information from Japan. However, as interest has grown in wider dissemination to the general public of Japanese technical information obtained

for government purposes, the reach and complexity of Japanese copyright law may be becoming a larger problem. In addition, the growing tendency toward U.S. restrictions on foreign access to domestic technical information on the grounds of protecting international economic competitiveness may prove troublesome in negotiating with Japan for greater access to some of its technical information.

-- The volume of Japanese technical information of potential interest to American researchers is very large. For example, over 10,000 scientific and technical journals are published in Japan, in addition to countless books, monographs, technical reports, and symposia proceedings. It would be impossible, and quite wasteful, to acquire, translate, or disseminate all of this information to U.S. researchers. Selection of the very best and most important is essential, and should occur before translation if possible to conserve on the most scarce and expensive of all the resources in the chain: translators skilled in both languages and science or engineering.

-- Wholesale translation is essentially impossible due to cost and human resource limitations, so if Japanese technical information is to be effectively scanned, other approaches must be used. Machine-aided translation of Japanese to English is still experimental and typically only works after careful tailoring of the computer program to a specific type of literature. Existing systems also require both pre- and post-editing by a skilled translator.

-- For the forseeable future, first-hand observation and discussion of Japanese R&D by American experts who visit Japan is likely to remain the most effective approach to remaining abreast of current developments there. Translation of technical material is perhaps best seen as an adjunct to personal interaction, rather than as a substitute. Relatively few American scientists and engineers have either the financial resources or the in-country

contacts to arrange such visits and report on them without some institutional support.

Current Federal Programs and Future Opportunities

The Federal government has become increasingly involved in accessing Japanese and other foreign technical information, both for its own purposes and to assist researchers in the private sector and universities. With varying degrees of understanding and enthusiasm, and with typically limited financial resources, a number of efforts have been mounted by the Departments of Commerce, Energy, and Defense, as well as the National Science Foundation, the National Aeronautics and Space Administration, and the intelligence community to make such information more widely available. Opportunities for improvement remain.

-- No one knows the correct amount for the Federal government to spend on improving access to Japanese technical information (unless one decides on principle that the appropriate amount is zero). Better economic analysis is unlikely to provide much insight. However, relative to the costs of providing such information, or relative to the amounts of Federal money spent on original R&D here, the current level of spending is thought by many to be too low. For example, the new Office of Japanese Technical Literature in the Department of Commerce has been able to fund only a handful of special studies of the state of the art of Japanese science and technology in specific fields, whereas dozens if not hundreds of fields might usefully be subjected to such examination. And, Federal agencies report paying for tens to a few hundred Japanese to English translations last year, whereas last year's Japanese technical literature probably contains well over a hundred thousand articles. The current level of effort appears not to be commensurate with the opportunity.

CRS-7

-- It might not be unreasonable to consider spending between one and ten percent of a national R&D budget on access to foreign technical information. For the United States, this would translate into expenditures of about $1 to 10 billion per year. By contrast, current Federal expenditures for access to Japanese technical information probably total a few million dollars per year. This comparison suggests that additional action might not be unreasonable on a cost-effectiveness basis.

-- On the other hand, considerable uncertainty remains about the demand for technical information from Japan. Just within the past few weeks the privately-operated Japan Technical Information Service of University Microfilms, Inc., terminated operations, because the market for their product, regularly published translations of abstracts of Japanese technical articles, was too small. Thus, one is led to conclude either that more needs to be done to stimulate demand for this kind of information, or that the vendors have not yet found a way to tap into what many in the field believe should be the latent demand. Either the information is not being made available in a useful form or at an affordable price, or more time is needed to convince potential users of its value.

-- The National Science Foundation has become more active in helping American scientists and engineers travel and work in Japan. They have programs lasting from a few weeks up to three years. Some of these opportunities reflect Japan's openness to foreign technical visitors; some are even funded in whole or in part by Japanese interests.

-- Let me turn now to some other Federal options that might help. More details on each option and its estimated costs appear in the CRS report. (In preparing the CRS report, costs of typical programs were estimated. Both in pre-publication peer review and in the post-publication responses by informed readers, almost no exception has been taken to these cost estimates.)

CRS-8

1. The Federal government could subscribe to all Japanese technical journals and make them available to the public in the original, perhaps through the Library of Congress or the National Science Foundation. At an estimated subscription price of $100 per year, this would cost $1 million per year, exclusive of archiving and accession costs.

2. The Government could arrange for translation into English of all of the technical journals published in Japanese, which might cost on the order of $80 million per year. However, this would also require well over 1,000 translators, and they are not available. This approach would appear to be not only expensive but inefficient.

3. The Government could subsidize more short-term travel to Japan by American scientists and engineers. They might be required, in return, to report widely on the observations they make while visiting research laboratories and attending technical meetings in Japan. Sending 1,000 persons each year for a month might cost $10 million.

4. A Federal agency such as NSF or the National Bureau of Standards could support and oversee the publication of a "journal of trip reports" that would feature summary reports of overseas technical visits by American scientists and engineers, whether supported by government subsidy or not. (More detailed trip reports could be deposited in NTIS for public access.) Editing and producing such a journal might cost $300,000 per year, which might be recoverable via subscription fees.

5. The NSF or other agency might offer graduate fellowships for the combined study of Japanese and science or engineering. Support for a five-year program of study for each of 100 new doctoral fellows per year, which would include at least a year spent doing research in Japan, might cost something over $6 million per year when the full complement of 500 fellows was in place.

6. A Federal agency might also support senior fellowships for study in Japan for established scientists and engineers from universities, industry, and Federal laboratories. Travel, stipend, and language training might cost on the order of $75,000 per senior fellow each year. With cost sharing by some employers to reduce the average annual cost to $50,000 per fellow, a program involving 100 fellows at any given time might cost $5 million per year.

7. The existing Federal agency technical presence in Japan might be augmented by placing additional full-time technical staff in the Japan offices of such agencies as NSF and the Office of Naval Research. Placing twenty such persons at an average cost of $225,000 per year (including salaries, travel, administrative support, and other operating costs) might cost a total of $4.5 million per year.

8. To help offset the high start-up and market aggregation costs of private and professional society efforts to translate, abstract, and disseminate Japanese technical information, subsidies of limited scope and duration might be offered. For example, grants of $100,000 per year to each of 20 non-profit organizations and of $300,000 per year to each of five commercial services would cost a total of $3.5 million per year.

9. Tax incentives might be made available to private firms to help offset the costs they incur to access foreign technical information on the grounds that such information often finds its way to users other then the original acquiring company. It is difficult to estimate how much existing activity might qualify for such an incentive. One estimate is that a tax credit of 50% of qualifying expenditures might cost $150,000 per year for each of 200 larger firms and $20,000 per year for each of 1,000 smaller firms, for a total tax revenue "cost" of $50 million per year.

10. NTIS or other agencies might sponsor conferences and training programs to help industrial and other researchers learn how to access and use

foreign technical information. For example, offering six regional training programs and mailing 100,000 informational brochures per year might cost about $400,000 per year.

11. Grants and contracts might be awarded to universities, non-profit research centers, or industry to develop machine aided translation methods. Such a program might cost $10 million per year.

12. The Japanese Technology Evaluation Program (JTECH) of the NSF and other cooperating agencies might be extended to cover additional fields of science and technology. For example, doing 20 such field studies each year at a cost of $100,000 each would cost about $2 million per year.

Final Observations

The options described above do not exhaust all of the opportunities to improve U.S. access to foreign technical information, especially that from Japan. With the exception of the estimated annual costs of $50 and 80 million dollars for tax incentives to industry and for wholesale translation of all Japanese technical literature, however, most of the options are of relatively modest cost. For example, combining foreign language training upgrading, support for special graduate fellowships, subsidy of more overseas travel, and production of a journal of trip reports might cost a total of about $25 million per year.

It is difficult to quantify the benefits to science and technology - and thence to international industrial competitiveness - of any or all of these program options. However, if they made it unnecessary to spend just 0.02% of the $130 billion now spent on R&D in the United States each year, they would be cost effective for the nation.

On the other hand, it is not clear which of the program options, if any, would make a significant difference to the technical capabilities of the nation. At the same time, real budget costs would be incurred to put them in

place, in terms of either additional Federal spending or the displacement of an equivalent amount of current R&D funding.

In view of the uncertainty in the industrial demand for foreign technical information and the uncertainty in the effectiveness of particular options in meeting whatever demand does exist, Congress may wish to continue to monitor and reassess its commitment to improving access to Japanese technical information.

Mr. HALL. Thank you, Dr. Hill. As you know, we have a vote on and Congressman Boehlert has already voted and he's going to take over the Chair now.

But, in case you're gone when I get back, I thank you for your participation and for your input, and we're aware of your contributions and $25 million doesn't sound like much here. It sounds like an awful lot in Rockwall, Texas.

Mr. BOEHLERT [presiding]. Dr. Hill, thank you very much. We're in a process of—people often wonder why it takes so long for Congress to do things. There are a series of votes that are passing unanimously.

So, it's very important that we all trot over there and cast our aye vote for these things.

I have some questions that the Chairman, first of all, is particulary interested in having addressed. You indicate that because of the uncertainty of industrial demand for foreign scientific and technical information, Congress may wish to continue monitoring and reassessing its commitment to improving access to this information rather than pursue a more active approach.

What do you think is a reason for this uncertainty in demand?

Dr. HILL. Let me say, first, if I might, Mr. Boehlert, I think my final sentence there doesn't quite say that you want to monitor rather than act.

It says whatever action you take, you ought to monitor, which is what we're doing here this afternoon. As I said in my testimony, it seems to me that we may not be offering the right products. We being the government programs that are currently available, in translation, and even the Japanese Technical Information Service.

And I don't intend to be critical of that effort, but just to suggest that the evidence shows that engineers and technical people, particularly those in industry, don't read. They certainly don't read technical journals at great length.

We saw some data that suggested, I believe, that engineers read about six articles a month, and that's in all languages, mostly English of course.

It's unlikely that they're going to read another 50 articles a week in Japanese, or translated into English. It's unlikely they would read one more article a week, or even one a month.

Engineers use other methods of getting information. They do what we all do. They pick up the telephone and they call smart people, whom they know to be knowledgeable.

And I suspect, therefore, that it is the knowledge carried in the heads of people and the folks who go over and look at laboratories and spend a week, or a month, or a year in the Japanese scientific community who are the really valuable emissaries for information.

And most of us most of the time do not, in fact, go to the detailed literature for answers to any of our technical questions.

Mr. BOEHLERT. Senator Rockefeller, did you hear him speak?

Dr. HILL. Yes.

Mr. BOEHLERT. He indicated something to the effect that there are more than 10,000 scientific publications or technical publications annually in Japan, and about 100 or so are translated.

Are we translating the wrong publications? I mean, are we doing a poor job there?

Dr. HILL. I really don't have a good insight into that. My sense is that the things that are being translated are probably the premier journals and the first rank scientific basic research journals, where we've tended to be stronger.

We've tended to see this problem as a problem of translating the very cream of the crop kind of journals that the very best scientists in the first rank universities read.

Now, it may well be, however, that the really good stuff that you like from Japan is the things that the automotive engineers are doing on the shop floor at Toyota and Honda and Mazda, and that the things that they publish in their house journals may be more valuable to us.

Or the things they talk about at conferences of the Society of Automotive Engineers may be more important to us than the things that show up in the Journal of Physical Chemistry, or that sort of thing.

Mr. BOEHLERT. Dr. Roy, who is scheduled to testify in just a few minutes, has stated that the rationale for public funding for scientific research in this country over the past 40 years has been mistaken.

He says that the premise was that the good science leads to good technology, and that if we cultivate basic science, then technology and prosperity will follow.

Do you agree with this premise or do you think it's incorrect?

Dr. HILL. Mr. Boehlert, I think that Dr. Roy is a very wise man.

Mr. BOEHLERT. We know that. That's why he's on a panel of witnesses.

Dr. HILL. He and I share that view of the world.

Mr. BOEHLERT. You know, we do things in strange ways. I know from my own personal observation that over in Japan right now the U.S. Department of Commerce has a handful of people and, yet, the United States Information Agency has more than 100 people over there.

So, we do a very, very good job, for example, of showing the Japanese slides, presentations about these great United States and encouraging them to visit us, and that's all well and good.

We do a lousy job in terms of interfacing with our business people who are going to Japan to help them do business with the Japanese.

And while I can understand the propensity on the part of some of my colleagues to engage in Japan-bashing, I think really we ought to look in the mirror more often.

We're part of the problem. Dr. Hill, I thank you for your testimony. I don't have any further questions and I don't think the Chair, through counsel, has any further questions.

Thank you so much. The next witnesses, we'll have a panel of four. Dr. Rustum Roy, from the Materials Research Laboratory from Pennsylvania State University; Mr. Ora Smith, who is Director of External Technical Development for Rockwell International Corporation; Mr. Justin Bloom, the former Science Counselor at the U.S. Embassy in Tokyo, and I'm looking forward to hearing from you, Mr. Bloom; and, Mr. Tom Satoh, President of T. Satoh and Company of Washington.

Why don't we go in the order that the witnesses were called, Dr. Roy. And, incidentally, your full statements will be part of the record. If you wish to summarize in any way, that would be welcome.

We're not trying to give anyone today the bum's rush because you are important witnesses and you have important statements, but today is somewhat unusual.

On the Floor of the House we have the Department of Defense authorization, which is one of those minor bills involving $300 or so billion, and then shortly, we will recess in the House to prepare for receiving Prime Minister Mulroney of Canada. So, this is a rather unusual day. Please forgive us. Dr. Roy, would you start please?

STATEMENT OF DR. RUSTUM ROY, MATERIALS RESEARCH LABORATORY, PENNSYLVANIA STATE UNIVERSITY; ORA E. SMITH, DIRECTOR, EXTERNAL TECHNICAL DEVELOPMENT, ROCKWELL INTERNATIONAL CORP.; JUSTIN L. BLOOM, FORMER SCIENCE COUNSELOR, U.S. EMBASSY IN TOKYO; AND TOM SATOH, PRESIDENT, T. SATOH & CO.

Dr. ROY. Thank you, Mr. Chairman. Most of my statements are in the written testimony. I want to summarize along slightly different lines from what I've been hearing said.

You asked us to address two problems. One is the relevance of foreign generated information, and the other is are there opportunities we may be missing.

On the first point, I think it's much more profound, the impact of the foreign literature, than most of our scientists are aware.

I come from a unique stance. I'm a playing coach. I mean, I'm a senior research scientist in the lab getting my research money, big bucks out of the Federal Government, DOD and everybody else, and I write and present dozens of scientific papers every year in every part of the world.

And I also analyze science policy, as Dr. Hill said. So, as a Materials Scientist, I head up one of the biggest materials labs in the country. And my question is do our scientists pay attention to the foreign literature? The answer is not enough.

So, that's part of it, as you said, it's our problem. Is the scientific community any more aware than the Department of Defense, or than USIA of the responsibility of informing itself.

The bias in our scientific community, as Dr. Hill indicated, is toward to the high science journals. But I hold in my hand something called a "Morimura Brothers Ceramic News Digest."

There's more good information in this because this is where the payoff is for what the citizenry wants. But 99 percent of the scientists and engineers never heard about it.

The first thing is to educate our own community. Secondly, I want to take material science as the core technology. It's not a peripheral thing, like biotech, where we don't have any jobs yet, but material science is the core in which a lot of U.S. industry rests.

I want to give you two kinds of anecdotal things that draw from that in my analysis. You know, if you take a look at where we stand, where we get some of our information on the high science, you will be surprised.

High science itself is moving to applied science. Physics is moving to material science. The last two years' Nobel laureates in physics are in scanning tunneling microscopy and superconductor materials. So, applied science is where the action is today.

In applied science, I give this anecdote about how we get information into the science community. The Japanese had taken Soviet science on making diamond films.

I'm over in Japan visiting a national MITI lab where a post-doc who worked with me, who is a big shot now. He took me down to show me this silicon wafer with diamond crystals.

I said, my God, how can you do this. I come over here, I called the Navy, I said, do you guys know what they've done? The Navy gives us the money, it triggers all that stuff, I asked the Japanese where they get it, it's from the Soviets.

So, I'm over in Moscow and in Moscow, at the Soviet's expense mind you. (The Japanese visit was at the Japanese Prime Minister's expense.) So, I go over to the Russian lab and I say, my God, these guys are even further ahead in basic work.

So, I come back and I tell the DOD, do you know what the Soviets are doing? It was all there in the open scientific literature. But the entire U.S. Diamond Research was triggered by what? My visit, not the literature. That was my field. I had screwed up. I mean, it isn't somebody else.

What was I doing neglecting the literature. It was also in the Japanese literature. The Soviets published a million books on diamond films, this big, for handing out in the subway, and the U.S. was asleep at the switch.

So, what did we do? We started a consortium. We have 20 some companies, now our role is to get the science and technology out to our technologists.

But it is not picked up by translating journals. Translating journals, nobody reads the damn-fool things. I mean, we know that nobody reads the literature. Dr. Hill has referred to that.

That's a completely fatuous way of doing it. If you want to do it cost effectively, I'd say more trips by senior people. The Office of Naval Research invented this 40 years ago.

Mr. Justin Bloom was involved in it. This is not a new idea. But our American faculty must be over there. We have today, at Penn State, we have a Senior Professor in Japan. We have three graduate students in three different companies in Japan.

The Japanese companies are extremely cooperative. Now, our Penn State lab has trained 100 of the senior-most Japanese managers in ceramic technology over here. So, there is reciprocity to think of—you know, the reciprocity in science is very peculiar.

The opportunity is there, do you utilize it? The Japanese have proved that they are a science-utilizing community. We have tended to think we are a science-producing community.

And science production isn't enough. The quote that you gave is, "technology leads to science." We have made a blunder for 30 years. It's time to correct the blunder.

Science by itself will not lead to technology. The foreign dominance of the literature is here, it's not going to go away, and I think we've really got to pay attention to it.

And I think that Dr. Hill already made the point. Unfortunately, for us in the research community, it's the cheapest way. The most cost effective way of getting new knowledge is simply to go and pick it up.

And the Japanese taught us that in the '50's and '60's. That doesn't mean I suggest that you cut the research budgets of NSF or DOD. We need much more of that fundamental useful research.

But it is a very cost-effective way to get new science and technology, to just go and visit, establish personal relations.

Most of us in the senior professorial game can walk into any lab in Japan or Moscow, so we need to continue that much more than translating journals.

Thank you, Mr. Chairman.

[The prepared statement of Dr. Roy follows:]

Testimony of Professor Rustum Roy

Director, STS Program; founding Director

Materials Research Laboratory, The Pennsylvania State University

Introduction

Mr. Chairman, I appear before your committee today to testify on a matter of great concern to all of us: improving the competitiveness of U.S. technological industry, and the role that knowledge and technology generated abroad can play in this task.

You have asked witnesses to address the relevance of foreign technical relevance for U.S. R&D. I testify both as a participant in this process of transfer of high tech knowledge from foreign laboratories to the U.S. and as an analyst of the process. I will provide data and judgments which persuade me that the U.S. scientific establishment has been living on past realities when the U.S. totally dominated science and technology. We have therefore not paid enough attention to the slow and steady progress that the rest of the world has made to the point where we learn every day of major new advances discovered abroad.

Objective Evidence of Foreign R&D Growth

The statistics on the growth of the share of U.S. patents taken out by foreign nationals is old hat by now. Anyone who thinks that we can--within less than a couple of decades, if we make major changes--restore competitiveness in high and middle tech with U.S. track balances falling the way they have been, is dangerously uninformed for policy making. The most dnagerous illusion is that the U.S. has a comparative advantage in "high tech," and we are better at "innovation" hence the road ahead can be fixed with minor changes. I find a variant of this complacent attitude in another expression which typically takes this form: The Japanese are very good at copying, adapting and at engineering, but they are not "creative" and "innovative." This canard is repeated so extensively and frequently that I want to lay it to rest, but first I want to deal with the other major error all of us made in U.S. science policy some forty years ago.

Technology Leads to Science, NOT the Other Way Around

The reason why most of us in this country are misled about basic research, creativity, etc., is that the U.S. government, the Congress and the scientific community have for 40 years been badly mistaken in their entire rationale for the public funding for scientific research.

After WWII the enormous success of U.S. technology in bringing unprecedented prosperity to the people, in capturing world markets for our technological products was attributed to our superiority in science. We argued the case--explicitly stated over and over again recently by Mr. Reagan's Science Advisor--that if we just took care of basic research, good science, etc., that technology and prosperity were bound to follow. I have provided the data and developed the arguments to show how they slipped into this error in detail in my book Lost at the Frontier (co-authored with Deborah Shapley) and will not repeat them here.

This premise, of course, as all historians have said all along is nonsense. The exact reverse is true. Good science can be done when based on a healthy technology, and many of its seminal advances come from technological advances. "Thermodynamics owes more to the steam engine then vice verse" is the irrefutable paradigm for this view. The latest extraordinary proof is in the area of high T_c superconductors where serendipitous discovery of a new material--much of it very applied and almost amateurish science--will give the theoreticians a ten-year lease on life.

The Hubris of American Science

Thus even during the seventies and eighties as the American steel, consumer electronics, robotics industries clearly were being outpaced in the marketplace, we retained the attitude that American "science" was still the best, superior, etc. A smugness had settled over U.S. science--that we had little or nothing to learn from others in science, and setbacks in technology did not matter because our scientific superiority would lead us on to the next high tech field (hadn't we proved that in computers and biotechnology?). And to prove it all, we could show an astounding string of successes at winning Nobel prizes.

But scientists with their reductionist proclivities make poor political leaders. Even while we bragged about our Nobel prizes the scientific research community represented by the National Science Board decimated science education. While NSF budgets multiplied tenfold, the percentage of the NSF's budget given to education fell tenfold. If then the scientists didn't care about educating the citizens about science, why should the public. Only in the last few years, principally at Congressional insistence, has the essential task of rebuilding science education for all (not merely to reproduce more specialized scientists) begun again. Again, it was the Congress that asked that a study be made to compare the "leading indicator" of scientific health--Nobel prizes--with the claimed increase in prosperity. The results, one figure of which is reproduced in Fig. 1, were devastating. American policy for forty years has been exactly the opposite of the unmistakable trendline for 40 years. Technological success as in Japan and West Germany was strongly positively correlated with NOT winning Nobel prizes.

It is, however, the third result of the postwar smugness of success with which we are concerned: the general feeling that we were so far ahead that it didn't matter what the other nations were doing. I was chair for some years of the National Academies' "Committee on Scientific Exchange with the USSR and Eastern Europe" and we were repeatedly asked to justify why we were "giving away so much" when they had so little to give us. As Japanese (and West German) superiority in innovation in many technologies became obvious, a common attitude became: that while the Japanese are good in technology they have cultural handicaps in genuine innovation in more fundamental areas. As an invited consultant to the Japanese Prime Minister's Science and Technology Office I have heard this echoed even in Tokyo.

Reality Testing: U.S. and World Science and Applied Science

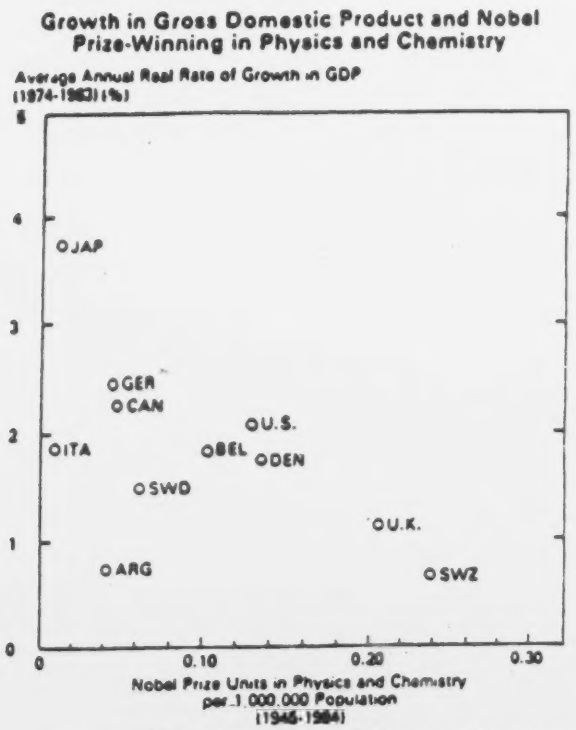
The fact is that things have changed dramatically in the last couple of decades: Other countries like West Germany and Japan invest much more heavily in civilian R&D (% of GNP is more than 1.5 x ours); likewise in academic research (Table I). The idea of spinoffs from military R&D have been proved to be absurd at worst and a grossly inefficient way of helping the

TABLE 1

EXPENDITURES ON ACADEMIC(-RELATED) RESEARCH

	% of GDP	$/capita	Total $ (billions)
Netherlands	0.63	62.50	0.89
West Germany	0.49	53.50	3.30
France	0.44	47.70	2.59
U.K.	0.377	34.50	1.93
U.S.	0.31	40.40	9.37
Japan	0.25	26.70	3.17

Data: C & E News, Dec. 1, 1986.



From C. Hill, Congressional Research Service.

FIG. 1

civilian technology at best. Clearly, with no implication that our engineers/scientists are less brilliant, the net output of other countries' R&D establishments have simply grown and become reasonably competitive with our own. In the aggregate, substantially more applied science and technology is now done outside the U.S. than inside. In the more esoteric sciences that may not yet be true but it surely will be sooner or later. I reproduce in Fig. 2 some recently compiled data (Devon and Roy, 1988) showing that in the materials research field--the hottest field of technology today--Japan has moved, in some cases, from one third of our output of papers to equal or exceed ours, in 20 years. In certain fields (e.g. catalysis) we have retained our lead. Let me give you another datum. In 1976 Professor L.E. Cross, my successor as Director of Penn State 's MRL showed that in a major field (transducers, piezoelectrics) of electronic ceramics (which now includes the superconductors) the Japanese published 60% of the literature, the U.S. 35% and Europe 5%. The fact that the other major developed countries are producing a very substantial amount of innovation from basic science to applied science to manufacturing and technology is not any longer in dispute. What we need to examine is in what fields they have the most to offer and how best we can transfer the technology.

Fields in Which the U.S. Stands to Learn the Most. Some Case Studies

As a chemist-materials scientist I, naturally, will refer mainly to these fields. A generalization, subject to the usual limitations of such, is that we have more to learn in basic and applied sciences relevant to technology; especially from Japan, West Germany and France, and in some fields from the USSR. Yet, especially from the USSR, there are peaks of basic science relevant to technology which we could exploit to mutual benefit if we learned how.

The Media as a New Force in Science Policy

Unfortunately, we observe an increasing presence of the distortions by the media-effects on policy. Some scientists have learned to use the media for publicity for themselves and for a field of research. Results are exaggerated, unrealistic hopes built up, and chauvinistic appeals

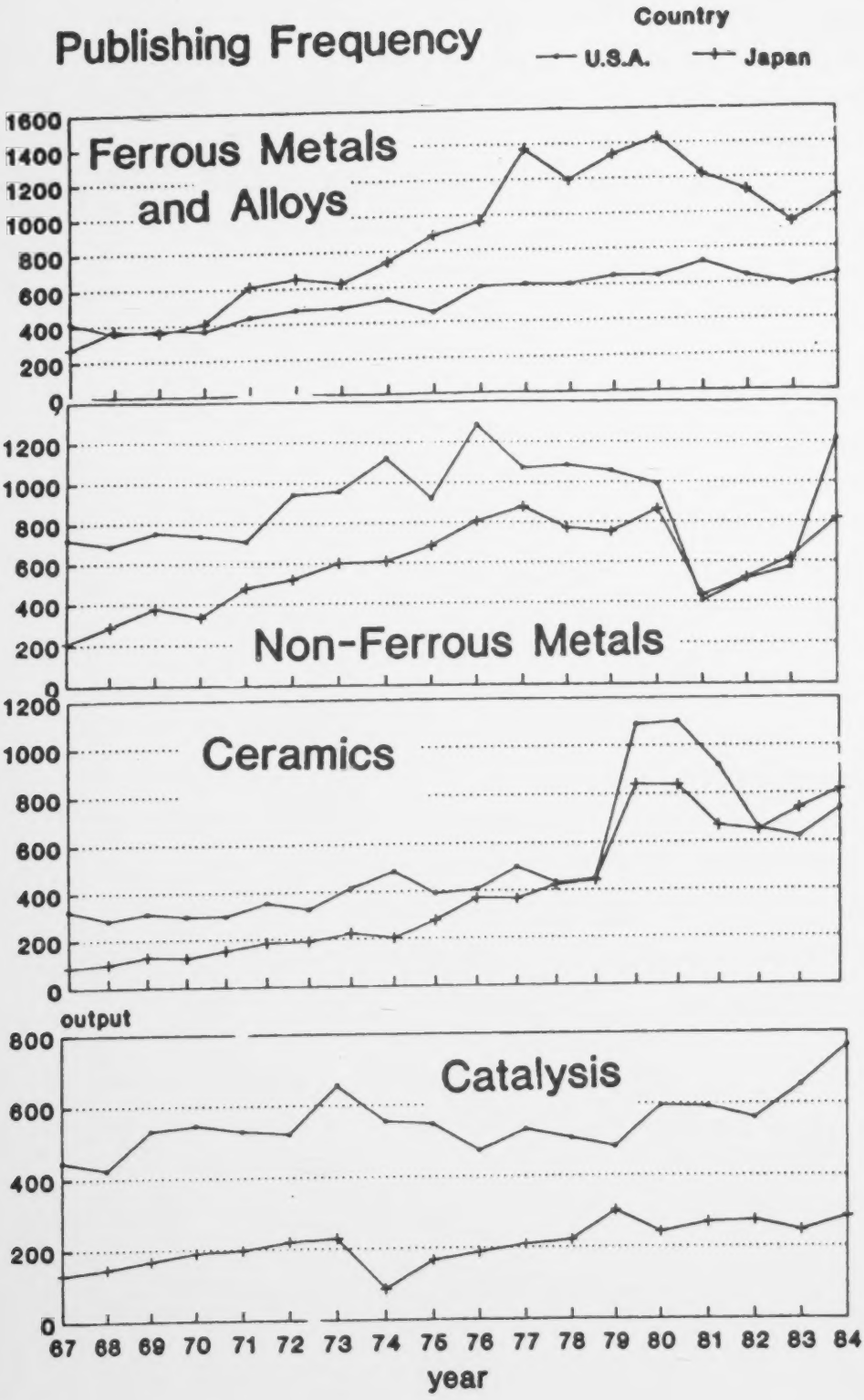

Publishing Frequency
Country
U.S.A.
Japan
Ferrous Metals and Alloys
Non-Ferrous Metals
Ceramics
Catalysis
output
year
67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84

Figure 2.

made, and amplified by media exposure. Regrettably corporate CEO's, Congresspersons and Senators, who do not have the time to sift the chaff from the wheat are influenced by the hyperbole and the very repeated mention of a particular technical topic on TV or the NY Times or the Wall Street Journal.

As a case study I would like to compare three major discoveries in the materials field all of which occurred in the last few years and in which the knowledge diffusion has taken radically different paths. Taken as a set they are extremely instructive.

Figure 3 lists the discoveries: (1) the U.S. discovery of a radically new process to make ceramic composites called the Lanxide process; (2) the Soviet discovery of a low pressure process to make diamond films; and (3) the Swiss discovery of a high T_c oxide superconductor.

Even among materials researchers probably less than 1% know of either the first or second, while 100% know about the latter and much of it is highly distorted. The technological potential as assessed by experts is in exactly the opposite ratio. High T_c superconductors after 1,000 person years of research effort have virtually no technological outlets in sight. Diamond films are already in production.

In Figure 3, I make a comparison of three major materials discoveries each announced at the Materials Research Society annual meetings on three successive years. Studying this table will prove very instructive to policy makers. Why did the U.S. science community and its agencies (excepting DOD) not pick up on the Lanxide discovery? Lanxide is a new process able to make virtually any ceramic matrix composite in much larger sizes and with much higher toughnesses than ever approached before. This is a purely U.S. discovery. Note that the company has filed over 1200 patents worldwide. Note there are many new short-term technological opportunities. What sociology and psychology makes it possible that not one university faculty member has submitted one proposal to any agency 3 years after its public announcement? A dozen papers documenting the advance are now published. The answer is in the first row of the table: The absence or presence of a stream of newspaper and journal articles laced with hyperbole. In the case of Lanxide a privately held company had no reason to flaunt its

THREE DISCOVERIES (STARTING)

	MRS DEC. '85 Lanxide Announced	MRS DEC. '86 High Tc Super-conductor Confirmed	MRS DEC. '87 Diamond Films Announced and Confirmed
Advertising Hype	Strictly avoided. Technical press missed it.	Enormous	Very minor. Technical press picked it up.
Impact on Research	Not one proposal submitted to NSF, DOE.	Cast of thousands working outside their field.	Considerable interest. Minor initiatives.
Impact on Agencies	Only DoD response. Ignored by ALL others.	Measured, studied response. Not overwhelmed.	DoD responds; others ignore.
Impact on Industrial Research	Major potential. Replacement and new technologies.	Unknown. Most analyses-dubious.	Major potential. on wide variety of existing products.
U.S. interest	100% U.S.	U.S. role--minor	U.S. role--v. small
Technological	>1200 patents filed by one company	Patent positions appear irrelevant so far.	Japanese far ahead in tech., USSR in science.

Figure 3.

real success. It is the very opposite of the HTSC situation, where no company had an advantage and the hype over the most trivial experiment had advertising value to increase stock price, has been extreme. The U.S. relative position in HTSC research is modest at best, and except for the paper by Wu et al. which may have given the U.S. a two-week start and the high J_c epitaxial films at IBM this country has not made any major contributions. In the case of the CVD diamond films the situation is still different. Indeed it is, I believe, the most typical situation which will face most national science policy planners. The science here is largely Soviet and the technology largely Japanese. The question facing U.S. R/D policy makers in an era of a zero-sum in competent materials research personnel, and increasingly in dollars, is how one should distribute the resources over several such promising areas. It should be obvious both that up to now, even scientists, the policy makers and certainly the public have been making judgments based entirely not even on critical analysis of the opportunity in the technical press, but on media hyperbole.

The Relevance of Foreign S&T for U.S. Competitiveness

The metaphor I have developed to describe the reality of the R&D system is the so-called 2-trees model--one for science and one of technology. The second tree is a consumer of the fruit of the first--knowledge--among many nutrients needed for its growth and health. The Japanese "miracle" was based partly on effective utilization of knowledge produced all over the world. In the fifties, sixties and seventies Japanese scientists systematically harvested (completed openly and above board) the yield of all major national S&T systems. It was an enormously cost-effective way to do research.

Generating one's own general basic science to "feed a set of technologies" is both enormously expensive and relatively risky. Moreover, there is no assurance that, even within a company where such results are discovered, they will be exploited within the originating company. This is why the U.S. corporate world has cut back significantly on long-term research even that closely aligned with their principal product areas.

Given this situation the strategy the U.S. should follow is clear.

1. Provide public support (via some mechanism) at least to industry associations for pre-competitive long-term research so that the generation and transfer is kept as local as possible.
2. Improve knowledge transfer from universities to industries. There is already an enormous flurry of activity in this field. Unfortunately the universities do not have that much that is likely to be useful and there is a missing link of continuing basic research within the company. The process is much more complex than many of the enthusiasts imagine.
3. Establish a systematic scheme for scouring the world's important research laboratories for the wealth of usable information contained in their results. Members of this cadre of information "scouts" must have both breadth and maturity, and the trained eye to pick up the anomaly, the unexpected. This calls for senior personnel largely from industry and the few universities who have been working closely with industry for decades.

Mechanisms for Learning from Abroad

1. The Scientific Literature: No One Reads It

The scientific literature has become a joke--no one reads it. Literally (see *Physics Today*, April 1988 for an example). We are immersed in a giant explosion of ignorance. Every year the amount of technical information increases dramatically. Moreover the information density goes down rapidly because many papers are repeated in 3-6 different presentations. At the same time the human capacity remains fixed and the time for reading has diminished strongly (because everyone is writing papers and proposals). By taking a ratio it is clear that every year every scientist, knows a smaller and smaller fraction of her/his own field. As Professor Peter Debye, the Nobel-laureate chemist said, no one at the frontier of a field can or should waste time reading the literature.

Needed Literature--Compressors (Evaluative Reviewers)

Hence what we need are mature engineers and scientists to evaluate and review the vast literature and compress it into short newsletters giving references and abstracts--categorized rationally for the American audience. At least 90% probably 95-98% of the papers published have no useful information whatsoever. (These are not idle estimates; they are easily arrived at by citation studies.) The practiced eye can spot the novel and weed out the potboilers.

2. Scientific Meetings

Nothing threatens the U.S. scientific system more than the unchecked growth of scientific meetings. In a hot field many scientists have become like TV evangelists hopping across the country giving the stump-speech instead of working in the laboratory. The free enterprise system allows anyone to have Andy Warhol's "15 minutes of prime time," and scientific entrepreneurs therefore organize duplicative "international" conferences at the drop of a hat. None of us in the scientific community has even raised the matter of policing this proliferation. The percentage of papers presented at the typical conference that would be of any value to a technical information scout is even less than the percentage of useful papers. The professional scientific meeting with its serial presentation of papers is one of the world's most inefficient systems of information transfer. Yet it grows every year dooming scientific productivity even further.

3. Laboratory Visits and Personal Relations

There is an important element in scientific meetings--that is sizing up the best people and meeting them. This is one element which leads to the most important vehicle for gathering foreign technical information: establishing personal relations with the leaders in the field worldwide.

With such relations established with a few (up to half a dozen maximum) colleagues in each country one can organize a one-week to two-week set of lab visits and discussions which will provide absolutely key information on the state of the art. I recommend that every U.S. agency encourage international laboratory visits--not only attendance at meetings.

This is hardly a new idea. Our Office of Naval Research pioneered this very concept with its London Office 40 years ago. It is now expanded to several cities. I recommend that mature, U.S. scientists and engineers be supported to maintain a network of personal contacts in their fields. With visits, telephones and FAX machines you can obtain 10^3 times more information/$ than by any other means.

Two Examples

I personally brought the science and technology of vapor phase diamond films from the USSR and Japan respectively because I, by coincidence, had excellent relations for a decade with the Directors of the Institute of Physical Chemistry of the Soviet Academy of Sciences (when Academician Derjaguin had discovered the process) and the National Institute for Research on Inorganic Materials in Tokyo (where the science was converted to a usable technology). By coincidence during visits (paid for by the Soviets and Japanese, respectively) I saw what had been achieved. It was so startling that I was immediately able to alert our corporate world and the DoD. Now 3 years later we have surprised our Japanese colleagues with the rapidity of our catchup and our transfer of knowledge to the 27 companies in our consortium.

The second example is in the flurry of activity in the high T_c superconductors. Having worked in the field a decade earlier, we were known to all the leaders of the field. When results started to come thick and fast, it was typical to have weekly, occasionally daily, FAX interchange with Japan, England and the leading U.S. companies. That level of technical information gathering IS ONLY POSSIBLE on the BASIS OF A PERSONAL RELATIONSHIP.

Summary

The U.S. today has lost its comparative advantage in high tech. For the next decade or two really high tech discoveries in the civilian sector will in most cases lose us market share compared to our traditional shares in similar established technologies. It is essential that we do something new and different to start to turn this around.

Japan, West Germany, England, France (even India and China) have S&T information of great potential value to us. The best way to access these really useful information is through maintaining personal relations with the appropriate and relevant leadership abroad. By carefully executed laboratory visits (with reports) and frequent telephone and FAX contacts, mature, senior U.S. researchers can do a great deal to taken advantage of the worldwide pool of S&T information.

Mr. BOEHLERT. I think I heard you right. You said on the translated technical journals, "nobody reads the damn things." Could you be more specific?

Dr. ROY. They don't read the regular journals in English either.

Mr. BOEHLERT. Mr. Smith, would you proceed?

Mr. SMITH. Thank you very much. I'm pleased to be here. I had to come all the way from Southern California today, and I'm glad to see the Washington weather is just like home.

I guess I have the privilege of giving the big company perspective today. I'm from Rockwell International which is, I think by any measure, a big company.

We have about $12 billion a year in annual sales. About 120,000 employees. In spite of the fact that one-sixth of those employees are scientists and engineers, however, we find that we can't invent everything that we need.

We have to look outside the company for technology. Our businesses are high technology businesses, they're diversified, and we operate in 27 countries.

I tell you this just so you know the context from which my comments are coming. Rockwell is in aerospace, in electronics and automotive products, and newspaper production equipment, industrial sewing machines, meters and valves, industrial automation, a diverse and lengthy list.

My job in the company is to help the business units gain access to and utilize technology from outside the company, including foreign technology.

And we do that in order to expand our technical base and to try to leverage our own internal R&D investments.

Our focus has been on Japan and in the counties of Western Europe. We pay some attention to Australia and the Republic of China.

We're looking at India and the People's Republic of China as areas in which interesting technical developments may soon be occurring.

We think that our interest in foreign technology is not something that is unique to us. No technologically intensive business today can afford to ignore what goes on in the rest of the world. Technology is a global commodity. It can come from anyplace. We in the U.S. don't invent everything that is invented, and we certainly can no longer afford to reinvent things that have been done elsewhere.

In December of 1986 we opened an office in Tokyo called the Asia-Pacific Technology Liaison Office, or APTLO for short, and the purpose of that office was to develop a companywide awareness of technical developments in Japan, to help the different business units develop direct relationships with Japanese companies, universities and government labs, and to help the managers in our company understand and learn from Japanese management practices.

The office is staffed by U.S. citizen and by Japanese nationals. It has been a very good investment for us already in the short time it has been operating. I have personally learned two very obvious lessons—now they are obvious—about Japan. One is the country is very rich not only in technology but also in technical information. It is there for the access, but the key to accessing it is physical

presence in Japan. We could not do it without physical presence. We can't do it through the literature, translated or otherwise.

We are also active in Europe. We have a somewhat different situation there. In Japan our business is done by direct sales and through joint ventures with Japanese companies, whereas in Europe it is done by subsidiaries and affiliates which are legal entities of the countries in which they do business, so they are not really viewed as foreign even though they may be foreign owned. They are European legally.

Our approach there has been somewhat different. We have tried to weld together our resident technical personnel into a force which would work to understand what is happening in Europe technically and try to communicate those technical developments back to the rest of the company. This group we call EUROTEC, which stands for European Technology Cooperation Committee, is chaired by myself and Mr. Campobasso, our senior vice president of international business.

That is just background. I would like to talk now just for a minute separately about the access situation in Japan and in Europe. Our experience has been that U.S. companies, including ourselves, who have a physical technical presence in Japan and who have followed up on that technical presence with business development activities have been pretty successful over the past two to three years in accessing Japanese technology, at least through Japanese companies.

It has been aided by the fact that the Japanese companies have been reaching out to the U.S. for their own purposes, mainly driven by the very high yen and by trade friction with the U.S.

Access to what is going on in the government R&D institutes has been somewhat more difficult. We find it to be improving, mainly because of pressure brought about by the U.S. Government through, for example, the Science and Technology Agreement Negotiations. It is now possible to put American research personnel in a number of Japanese government labs for an extended period. We are beginning to do that. They are opening up. We certainly hope they continue to open up more.

The absolute key to success in Japan remains a direct physical presence, and there has to be mutual benefit. The Japanese define benefit when it comes to technology exchange in a more long-term way than we tend to do. They are not so motivated merely to sell technology, but they want to invest in it. They tend to be less interested, in my experience, in making current income off their technology than in trying to use it to develop access to markets, to engage in co-development for extended periods of time. The U.S. companies should imitate those goals, in my view.

Despite the generally favorable situation in Japan and the fact that much of the burden, I think, for accessing what goes on in Japan rests on U.S. business, there are some things I feel government could do to help us out a little bit. One item is in the taxation area. I found out that it is extremely expensive to put an American expatriate in Japan because of the tax burden. Living costs there are very high. The fellow who is there has to be compensated to offset those very high living costs. That becomes taxable income in

Japan, which has a much higher marginal tax rate than we have in the U.S.

Then in turn, the reimbursement he has had to cover his taxes itself becomes taxable income, and this whole thing snowballs until, after a few years in Japan, the tax bill alone becomes so high that many companies find after three or four years they can't afford to have anyone there anymore and have to bring a person back to the U.S. just as he is becoming very effective.

There are, of course, credits and income exclusions, but they don't offset the situation. Ideally, we would like to see it as cheap for an American expatriate to be placed in Japan as it is for the Japanese to place an expatriate in the U.S. They get a bargain compared to us because of the lower marginal tax rate here and the fact that it is cheaper to live in L.A. even than it is in Tokyo.

The second area is in the area of translation. It is true that foreign technical literature is not always the main source of information, but it is extremely useful. While many conferences are held in English, most technical literature is not translated into English. It is very expensive, very slow. When you do get it translated, it tends not to be timely. As Dr. Hill said earlier, that are not enough translators in the world to translate everything that is interesting in Japanese.

We would be very interested in seeing a Federal R&D initiative in pushing machine translation. We know the Japanese are already at work on it. We don't think it is an impossible problem, but a successful approach to automatic translation of Japanese into English would be extremely helpful to us and we would encourage an R&D program toward those ends which is Federally funded.

One topic I would like to talk briefly about is the U.S.-Japan Science and Technology Agreement. I understand that that agreement is concluded or almost concluded. I think we would have liked to have seen some closer contact between government and industry during the negotiation process.

We did have some inputs through OSTP and through the U.S. Embassy staff in Tokyo, but it was not real close, and our director of our office in Tokyo tells me that only one member of the American Chamber of Commerce on Japan's R&D committee was invited to visit the U.S. negotiating team during that. I think it would have been helpful if that had been a closer process.

It sounds like, from what Senator Rockefeller said, that we came out all right anyway. We hope very much that the S&T Agreement is going to continue to cause the Japanese Government to exert some pressure on companies and government labs to continue to share information with U.S. companies.

The situation in Europe, as I said, is somewhat different for us because we are viewed as European. The European government labs, universities and the consortia are open to us in spite of the fact that we are foreign owned. We do belong to some of those consortia.

The main problem that I see in Europe is that there is a rapidly growing resentment over what is viewed as excessively restrictive U.S. export control to NATO countries. I surveyed our European technology executives recently, and several of them brought up this issue, and they fear that the export control friction between the

U.S. and Europe may result at some point in the future in some kind of retaliation toward the U.S. Of course, the thing we fear is prohibitions on foreign owned or U.S.-owned companies from participating in some of these European consortia.

We would like to suggest—I have this in some greater detail in my written remarks—that the government should consider modifying the export regulations tc carve out some clear exceptions for certain classes of information and products exported to Europe. The situation is especially critical for technical information, not products, but just technical information that may be unpublished.

Our researchers constantly worry about violating the export controls. They find they have to engage in lengthy consultations with the legal staff before they can even hold a conversation with a European colleague even though he may even work in our company.

This chilling effect on technical discussions, I think, is undesirable in the long term and we need to do something about it. We think that one way to do something about this problem while maybe even improving our ability to slow exports to the Soviet Bloc is to try to negotiate a stronger and more effective COCOM agreement. We think that COCOM has not been as effective as it good have been, and it would be, I think, good if we could make COCOM's re-export provisions of technical data enforceable so that we could more freely communicate with our colleagues in NATO without constantly fearing running afoul of export control restrictions.

That basically concludes my remarks. I would be happy to answer any questions. Thank you.

[The prepared statement of Mr. Smith follows:]

Pre-filed Written Statement of
Ora E. Smith
Director, External Technology Development
Rockwell International Corporation

To the Subcommittee on International Scientific Cooperation of the U.S. House of Representatives' Committee on Science, Space, and Technology.

April 27, 1988

Introduction

Rockwell International is a high technology diversified manufacturing company serving industry and government with operations in 27 countries. Our total annual sales for 1987 were over $12 billion, of which about $1.3 billion resulted from sales outside the U.S. One of my responsibilities at Rockwell is to help our various businesses gain access to and effectively utilize technical developments originating in countries other than the U.S. in order to expand our technological base and leverage our R&D budget expenditures. Our main focus of attention has been on Japan and the nations of Western Europe, with some activity in Australia and the Republic of China. We also look toward the Peoples' Republic of China and India as areas in which interesting technical developments may also be occurring.

Rockwell has maintained a formal activity searching for international technology since late 1985. It has become increasingly apparent to the management of our company that technology is now a global "commodity" in the sense that no one country or region of the world possesses a monopoly on the ability to apply scientific knowledge to commercial enterprise. We realize that to compete successfully in the global marketplace we must have knowledge of and access to technical developments wherever they may occur in the world, not just in the U.S. Our situation is not unique. It is common to every technologically intensive enterprise. We no longer can think of the United States as the world's only repository of technology, and we can no longer afford to spend money re-inventing ideas that have already been developed elsewhere in the world. To remain competitive it is absolutely essential that we improve the leverage of our R&D budgets by taking advantage of technology available to us from foreign sources.

In December, 1986 Rockwell opened under my direction an office in Tokyo which we call the Asia-Pacific Technology Liaison Office, or "APTLO" for short. The purposes of this office are to develop a company-wide awareness of technical developments in Japan, to help our business units develop relationships with Japanese companies, universities, and government laboratories, and to help our managers understand and learn from Japanese management practices. In the short time this office has been open it has proved an unqualified success, and I have learned two important principles: first, Japan is a country rich in technology and technical information, and second, there is

absolutely no substitute for a long term physical presence when trying to access foreign technology.

More recently we have undertaken to enhance our access to European technology. The Rockwell business position in Europe is much different from that in Japan. Whereas in Japan we operate mainly through joint ventures, licenses for specific products, and direct sales from the U.S., in Europe we have substantial manufacturing operations, and our businesses are conducted by subsidiaries and affiliates which are legal entities of the countries in which they operate. Our approach to technology access in Europe has been to try to "weld together" our large but diversified community of resident technical personnel into a force which would work to understand European technology and communicate that knowledge throughout the company. In short, to become an analog of the APTLO in Tokyo but working in a different way. Accordingly, we formed an organization called "EUROTEC," which stands for European Technology Cooperation Committee. That committee, working under the oversight of Thomas A. Campobasso, Rockwell's Senior Vice President - International, and myself, has been charged with the task of developing comprehensive knowledge of European technical developments and communicating it to the rest of the company. While this undertaking is new, I am encouraged by the initial results.

I will now address separately the access situations in Japan and Western Europe as I see them.

Japan

Success of Recent Access

First of all, I believe U.S. companies that have established technical presences in Japan and that have followed through with an appropriate level of business development have been relatively successful during the past 2-3 years in accessing technology developed in Japanese companies and universities. Most of the difficulties encountered in the access process involve the expected differences of language and culture, differences between long and short term business strategies, the necessity for building personal relationships (which is part of the Japanese business culture), and export-import control regulations on both sides of the Pacific. Generally, however, Japanese companies have been aggressively developing ties to American companies in order to circumvent the effects of the high yen and the recent trade friction. Access by these same American companies to technology developed in Japanese government R&D institutes has been somewhat more difficult, but the situation is opening up now partly because of pressure brought by the U.S. through the on-going bilateral science and technology agreement negotiations. It is now possible, for example, for an American company to place a researcher in any one of a number of key Japanese government laboratories for a significant period of time, provided the receiving laboratory feels it has something to gain in return. In other words, mutual benefit is the key, as the Japanese culture is not one to give anything away without some long term physical or market gain - not just temporary financial advantage.

The key to success in technology access now seems to be the ability of a U.S. organization to ensure that its best technical people have direct contact with their counterparts in Japan.

Despite this generally positive situation, I would like to suggest several actions that could be taken by the U.S. government to maintain and improve upon the current technology access situation.

Taxation

As I previously stated, personal physical presence is absolutely necessary to maximizing access to technology in Japan (or any other country). This requires that employees of U.S. companies be sent to Japan for extended periods, which becomes an expensive proposition, partly because of taxation issues. In the case of an expatriate American living in Japan, his taxable income typically far exceeds his salary due to various cost of living and housing allowances needed to induce him to move to Japan without suffering a personal financial crisis. Although there is available under U.S. law the choice of a $70,000 (plus housing allowances)foreign income exclusion or a foreign tax credit to reduce an expatriate's U.S. tax bill, the higher Japanese marginal tax rate creates an additional expense against which the employee must be protected to maintain parity with his U.S.-based counterparts. This reimbursement for Japanese taxes then becomes itself taxable income and the process snowballs until after several years the tax expense alone causes many companies to bring experienced and otherwise productive employees back to the U.S. just to escape the taxation costs.

I recommend that the U.S. certainly should maintain or increase the availability of the foreign income exclusion or tax credit, and that the U.S. government should negotiate with Japan to produce a tax treaty which will allow U.S. expatriates in Japan to be taxed with more favorable rates and thus reduce the "snowballing" effect of steeply increasing tax bills as an employee stays for an extended period in Japan. We should at lease obtain reciprocal treatment so that the tax burden on U.S. expatriates in Japan is equal to the tax burden on Japanese expatriates in the U.S.

Translation

Even though many international technical conferences are conducted in English, much of the technical literature of Japan is not routinely translated into English. Not only is translation expensive and slow, but there are probably not enough Japanese-English translators in the world to translate everything that would be useful. Our approach has been to arrange for translation of only those items which an initial screening indicates to be extremely important; otherwise, we restrict ourselves to abstracting, with the associated risk of missing important items. I recommend that the U.S. government should pursue as a high priority research and development into machine translation. Commercialization of this technology should be left to industry, but the R&D required is large, and I believe the availability of translation machines would be greatly speeded by major federal R&D funding. We know the Japanese to be hard at work on this problem, and it would be a shame to be once again beaten to the market by Japan with a useful and highly profitable product and service.

U.S.-Japan Science and Technology Agreement

I would like to have seen a closer connection between U.S. industry and the Japan-U.S. Bilateral Science and Technology agreement negotiating team, which I understand has concluded or nearly concluded a new agreement. While the team had some contact with industry, and while the U.S. Embassy technology liaison staff in Tokyo expressed interest in U.S. industrial experience in Japan, I believe there could have been closer contact. For example, my office in Tokyo has informed me that only one member of the American Chamber of Commerce in Japan's R&D subcommittee was invited to visit the S&T negotiation team.

I hope that the Science and Technology agreement provides some mechanism to cause the Japanese government to feel an obligation to persuade Japanese laboratories to maintain a positive attitude toward sharing information. In addition, I hope the negotiators managed to find a way to assure some degree of parity between U.S. access to Japanese laboratories and vice versa. This is a particularly difficult issue because on a strictly quantitative basis there is more technology in the U.S. than in Japan, and because the Japanese have been much more effective in accessing information from the U.S. than the other way around.

In the future I would like to see a government policy decision to involve U.S. industry more directly and intimately in the drafting and negotiation of such international science and technology agreements and memoranda of understanding.

Europe

As I pointed out earlier, our business situation in Europe is considerably different from Japan. Since we operate as corporate entities of the countries in which we do business we are treated as "European." Although we are just beginning to take advantage of European technical opportunities, it appears that European government laboratories, universities, and R&D consortia are open to any "European" company without regard to whether it is foreign-owned. Only the usual classification and intellectual property restrictions seem to apply.

One major problem we are beginning to experience in Europe is the great resentment which is building over what is regarded by many Europeans as an excessive degree of control exercised over access to U.S. technical information by the U.S. government. There seems to be a feeling that NATO countries are good friends of the U.S., and that the export license barriers erected by the U.S. are an unnecessary and hostile move - a kind of technical "Berlin wall." The hazard, of course, is that in the long run some type of European retaliation may be attempted. European countries do not restrict the export of technical information to the U.S. the way the U.S. restricts export to Europe. If the Europeans were to undertake an analogous restriction, it would make my job much more difficult.

I know from my personal experience in American industry that there exists generally such a powerful desire to obey the law with respect to technical information export that our employees often become fearful of discussing anything technical with a foreigner and

consequently appear to be overly secretive. These "chilling effects" of export controls on technical information exchange are a real hazard to our continued access to information elsewhere in the world, but especially from the NATO countries, where I believe there may be thought of retaliation against the U.S. I recently conducted a poll of our company's European technology executives concerning barriers to access by our company to European technology. Several executives responded with predictions that U.S. export controls will adversely affect our access to European technology. Here is a quote from one of the executives:

> "There is deep felt resentment against the U.S. Government export licensing to NATO allies and friendly nations. Restrictions on technology that this policy evokes appears to be often arbitrary and implemented for the commercial benefit of U.S. industry. Therefore, relief on the export of non-classified technical information to NATO and friendly countries would improve the attitude of European Governments to requests for technical information from the U.S."

I propose that the U.S. government should, as a matter of policy, undertake to modify our laws and regulations governing the export of technical data to create absolutely clear exceptions for many classes of technical information. It seems to me that our national security interests would be best served in the long run if we concentrated on closely scrutinizing export only of certain classified information, certain "hard" products (equipment, software), and design data and drawings relating to these "hard" products sufficient actually to enable someone to make substantial progress toward creation or construction of the product. Except for classified items, information exchange relating to non-military products and information exchange at the R&D level should be more freely allowed between the U.S. and friendly countries. The current environment is too restrictive and is overbroad. The chilling effect it produces on free technical discussions not only hinders our own current access to foreign technical information but is likely to result in formal retaliation, which will put U.S. companies at an even greater disadvantage. We also need to take another look at negotiating a stronger, more effective multilateral agreement on COCOM, which is still not an effective system. If COCOM were strengthened and its mutual export control agreements made enforceable, the U.S. would feel more confident of being able to export a wider range of products and information to its allies without the exported items finding their way into Soviet-bloc hands.

The taxation comments I made earlier apply also to Europe, although in Rockwell's case the effect is less noticeable because we do not currently have expatriates in European countries conducting technology searches.

I very much appreciate the opportunity to appear before this Committee and I hope my comments have been helpful.

Mr. HALL [presiding]. Thank you, Mr. Smith. Mr. Bloom?

Mr. BLOOM. Thank you, Mr. Chairman. It is a pleasure to be here before you again. It seems like these hearings have been going on for many years now.

Mr. HALL. It is a pleasure to have you all here, and I might say before you undertake your testimony that we are on a very major bill on the Floor, and that, I think, indicates the lack of members participating here. Your testimony is important and it is appreciated. It will be reduced to writing, each member will receive it, and you do very definitely benefit the Congress and the country by coming and giving your time and preparing as you have to give this testimony.

To all four of you I say that on behalf of the Committee. Now proceed, sir.

Mr. BLOOM. Thank you, sir.

I don't intend to give a lengthy presentation. My views on the importance of access to Japanese science technology, in particular, and to foreign science technology more generally are well known. For many years I felt I was a voice in the wilderness, but today my colleagues here and Senator Rockefeller and many others pursue a course that is identical to my own.

I think Dr. Hill's paper that you have been considering and his remarks today are right on target. They lay out all of the many options, with one possible exception that I would like to address, that are available to both the private and public sectors of this country. It is still, I think, highly uncertain whether any of the options proposed by Dr. Hill will be adopted because we have not yet come to grips with the cost-effectiveness of the use of foreign technical information.

Most of what I want to say here today, however, covers another subject. Senator Rockefeller referred to the Office of Japanese Technical Literature that has been formed in the Department of Commerce to carry out the implementation of the Japanese Technical Literature Act of 1986, and I think that my company has been one of the first contractors employed to do a special study for that office. And I would like to tell you about this study, because it tends to illustrate the nature of the problem, and what needs to be done.

We were asked to conduct a survey of the extent to which R&D organizations in the U.S. were making efforts to acquire information on Japanese science and technology in the specific field of advanced ceramics. This happens to be Rusty Roy's field. By the luck of the draw, Dr. Roy's lab at Penn State University did not come up in our sample that was surveyed, but I'm sure that he recognizes that problem.

This field of advanced ceramics was selected because it was known as one in which Japan excels, and at the same time, as sufficiently small enough to permit obtaining reasonably valid results through statistical sampling techniques. I caution that the results that I'm going to present to you should not be extrapolated to other technical fields, since each field almost certainly has its own characteristics in regard to the degree that its scientists and technologists interact with counterparts in Japan. However, as I have said,

the results are illuminating and I believe are worthy of careful thought.

By the use of a questionnaire, we polled one hundred American R&D organizations, selected randomly from a much larger population, known or believed to be working in advanced ceramics. These organizations were grouped into categories: large private companies, small and medium sized private companies, universities, government laboratories and not-for-profit research institutes.

We also polled separately the 37 member companies of the United States Advanced Ceramics Association's technical committee. We treated this as a specialized group, because I was afraid that the membership of this group would bias a more general analysis of the status of the use of Japanese technical information in the United States. We were able, through the use of specialized sampling techniques which increased the rate of response to a rather high degree compared to what is usually experienced in this country, so that I can tell you that 75 percent of the 100 organizations queried did respond. We did not use these same specialized techniques with the members of the Advanced Ceramics Association, USACA, I'll call it, and we received a 46 percent response.

Now, the fundamental question that was answered is illuminating all by itself. How many of these organizations have programs to follow what is going on in Japan—formal programs for accessing Japanese scientific and technical information? Here are the results: large companies, 43 percent; small and medium sized companies, 16 percent; universities, 18 percent; government laboratories, 54 percent; not-for-profit research institutes, 20 percent; and the USACA members, 76 percent.

Well, we anticipated that the smaller companies would be deficient in mounting Japanese technical information programs, if for no other reason than the costs entailed. However, it was very much of a surprise to learn that most of the universities surveyed had no program, and that only one appeared to have a relatively reasonable or large effort.

A possible explanation is that university-based R&D programs depend on the individual initiatives of scientists and engineers to collect information of use specifically to them. And they don't oversee programs for more generally acquiring technical information. In other words, if the questionnaire had been submitted to university libraries, rather than to senior scientists, we might have found that the libraries do try to collect information from abroad. But that might have been misleading in itself, because then we would have had to try to measure to what extent the information collected by libraries is actually used by university scientists. The same problem may exist in national laboratories, in not-for-profit research institutes, and even in large companies.

Those organizations that indicated they had no formal Japanese technical information programs in effect were then asked to indicate whether they had any intention of starting up such a program within a year. It was disturbing to learn that none of the large companies or universities intended to do so, of those that didn't have a program at the moment. And only 25 percent of the other organizations stated that they intended to start a program.

We were forced to conclude that there is a relative lack of interest in Japanese advanced ceramics technology among those organizations that do not already have a program in effect. Since our final report to the Department of Commerce is a long one—over a hundred pages plus appendices, I can't possibly give you even the gist of all of the findings. But let me give you just a few points that are particularly pertinent to this hearing.

Only large companies and the USACA members showed any extensive use of publications that actually originate in Japan. University respondents appeared to rely entirely on the journals of professional societies for information coming from Japan. Other organizations with technical information programs in effect used a broad variety of methods to acquire information, with many of these being based on the use of direct personal contacts, either in the U.S. or in Japan. And that finding strongly supports the contentions of the previous speakers, and of Dr. Hill.

Even those organizations with formal programs invest relatively small amounts of funds, and this, I think, is particularly illuminating. For about half of these companies or laboratories, their annual investments in acquiring Japanese technical information were less than $1,000. One large company stated that it invested more than $100,000 a year, and one government laboratory reported a figure of between $50,000 and $100,000 per year. Among the USACA members, the average expenditures were higher than in the other groups.

Almost all of the respondents said that the level of expenditure that they were now making to acquire information from Japan, was about right, and that they did not intend to increase this amount. And as I've said, the average amounts were very low. When you consider what it costs to keep a single scientist, let's say, or an engineer in Japan—several hundred thousand dollars a year—one wonders whether we really are intent on doing something that is significant in this area.

When asked whether the public sector or the private sector should take the leadership role in developing and carrying out programs for acquiring Japanese technical information, those organizations with programs already in effect in the U.S. were about equally divided in their replies—half thought that the Government should do it, and half thought the private sector should do it. Organizations without programs in effect leaned toward the Government at a ratio of 60 to 40. That is, a majority felt that the Government should take the lead.

Probably the most interesting part of this survey though, was the fact that, when we asked all of these organizations whether they thought that there were factors other than the acquisition of Japanese technical information that were more important in increasing American competitiveness in the field of advanced ceramics, essentially all respondents said that there were other factors that were more important than simply the process of getting technical information.

The report contains their comments, almost verbatim, and one can see, there is a significant problem associated with the way U.S. business looks upon the rest of the world. Again, I don't have time to go into all of these details.

I had mentioned earlier in my remarks today that there was one aspect of this whole issue that Dr. Hill did not address, and that I would like to call to the Committee's attention. As a fairly recent phenomenon, with one major exception, U.S. companies are beginning to invest heavily in establishing R&D facilities in Japan. If you look at the figures, you will find that this investment is far larger than anything that we have talked about here today. Chris Hill's figure of $50 million a year, as a proposed investment in this area, is nothing compared to what American companies—some of the investments some American companies are making in building and operating R&D facilities in Japan.

Based on what everybody has said, you begin to see what this means. If you were there, and if the scientists and engineers in your employment are interacting directly and continuously with the Japanese research environment, these laboratories essentially become part of the environment and have absolutely current information on what's going on. Now, of course, you have to realize that these scientists and engineers are Japanese, not American. There may be a few American managers and a few American scientists and engineers, but the majority, the heavy majority are Japanese. And so they understand the technical culture. They obviously understand the language, and they're able to absorb the information for their employers, to enable the employers to factor this into their management planning.

Very little has been written or said about this new phenomenon. And what worries me is, that some of the actions that have been considered in the Congress in years past, and even some that might be considered today, about trying to restrict the flow of U.S. technical information to foreign countries, may backfire on us. And we will find that companies who are advanced in their thinking, and who do have R&D facilities abroad, may suffer a severe penalty from our attempts to cut off foreign users from our technical information.

Thank you very much, sir, for the privilege of testifying before you.

[The prepared statement of Mr. Bloom follows:]

Foreign Technical Information and Its Link to Competitiveness

Statement by Justin L. Bloom, President,
Technology International, Inc., Potomac, Maryland

Subcommittee on International Scientific Cooperation
Committee on Science, Space, and Technology
U.S. House of Representatives

April 27, 1988

The mere fact that the Subcommittee on International Scientific Cooperation is holding hearings today on the relationship of the acquisition of foreign scientific information to industrial competitiveness is a clear indication that this long-standing issue has not been resolved. If anything, the issue has become more confused over the years because of the strong perception in the minds of some Members of Congress, Government officials, and policy formers in the private sector that the relative decline in U.S. world trade -- as evidenced by the loss of domestic and international markets for industrial and commercial products -- is inextricably linked to the strong imbalance in the flow of scientific and technical information between the U.S. and other countries. That is, the outward flow of innovative information through a variety of processes is much greater than the inward flow. Undoubtedly, this imbalance is a contributory factor to the international trade problem. The questions remaining are whether it is a critically important or dominant factor, or even whether it has produced net positive or negative effects. Furthermore, it is unclear what the impact might be of attempts to reverse a trend that has persisted for decades.

Let me say at the outset that the report prepared by Dr. Chris Hill of the Congressional Research Service is probably the best statement on the subject of acquiring technical information from Japan that has appeared in recent memory. I have read it carefully and thoroughly and I enthusiastically support his analysis. Later in my own remarks I will return to Dr. Hill's report to examine the program options he has offered. In the interim the points I wish to make may well prove to be consistent with Dr. Hill's assessment.

After having devoted more than 15 years of my professional life to the study of and involvement in the transfer of technical information between the U.S. and other countries, I reach the following conclusions:

1. There is no question in my mind that the U.S. as a whole does a poor job of keeping up with foreign scientific and technological advances, particularly in those countries where the complexities of the foreign language involved inhibit free interchanges. The countries of Asia are of course the best examples of those where we face this problem most severely, and no further elaboration of this point is needed here.

2. However, this condition may not be -- and probably is not -- true for all segments of science and technology. For example, when it comes to fundamental scientific information, English is the lingua franca of the scientific world. The goal of scientific research is to create new knowledge. This knowledge has no value unless it is disseminated to the rest of the scientific community, where it can be examined for validity and where, the creator hopes, he will receive recognition for the contribution he has made to the world's store of knowledge. This is best accomplished by publishing scientific results in English. Taking Japan as an example, since it is the foreign country that I know best, previous testimony before Congress has revealed that "only" 20% of Japanese technical publications are in English. Most of these English-language journals are devoted to the basic sciences and are obviously intended for foreign readership. What is more, a rapidly increasing proportion of papers presented at international scientific conferences and symposia are by Japanese authors and are in English. Subsequent publication of these papers in international journals presumably does not count in assessing the proportion of publications in English by Japanese scientists. Rather than trying to browbeat the Japanese into publishing more of their research results in English, we should be commending them for the enormous efforts they have made to learn our language and to use it effectively -- taking into account that learning English is not exactly an easy task for the Japanese.

Another segment of U.S. technical society that may not be severely constrained in its access to foreign technical information is represented by the large industrial corporation. Such corporations are often multinational in nature, with subsidiaries or joint ventures located in countries that are the economic competitors of the U.S. With large numbers of foreign employees who can interact continuously with indigenous counterparts, these corporations presumably are able to keep up with technological advances in the host countries. Alternatively, large corporations have the financial and human resources to maintain technological watches on their competitors. There is no incentive, however, for them to share the industrial intelligence they acquire at their own expense with their American competitors, so it can be expected that a considerable amount of duplication occurs within any particular industrial sector.

3. In a somewhat different context, too heavy a reliance on published foreign technical information, either in the original language or in translation, may be misplaced. Evidence for this conclusion is found in (a) the prima facie failure of abstracting and translation services in the commercial marketplace; (b) the significant time lag between obtaining the results of R&D and the appearance of these results in the formal literature; and (c) the sheer volume of the literature overwhelming the user scientist or technologist. What I will call the "supplier mentality" assumes that if information is made available, it will be purchased and used. While this is in fact true up to a point, saturation can occur if the user decides that he must set priorities on how much of his time is devoted to reading and analyzing. The conditions enumerated above apply to the domestic as well as foreign literature, so there may also be a subconscious or unconscious decision made by the user as to how he will prorate his available reading time between the foreign and American

literature. I believe that there is a natural tendency to give priority to keeping up with domestic advances made by one's immediate colleagues and competitors, compared to the more distant and less-known foreign researchers, but of course there are major exceptions to this tendency -- especially when the foreign sources are considered eminent and at the leading edge.

4. The rapid pace with which scientific and engineering advances result in new technological products should also act to inhibit too heavy a reliance on the formal, published literature, considering all of the delays entailed in publication. Under this condition, resort is made to less formal but more rapid means of communication such as the "invisible college" -- the informal network of people working in a given field who communicate with each other by attending meetings, talking to each other on the telephone, acting as consultants, or visiting laboratories.

5. Networking is particularly strong in Japan, where achieving consensus in the group still is more important than demonstrating individual accomplishment. It is here, in my opinion, that American scientists and engineers face their biggest handicap, since to effectively enter the informal network of information exchange in a foreign country requires more than a passing knowledge of the language of that country. This leads me to conclude in turn that only a very small fraction of the American technical community ever will be able to enjoy the fruits of participation in a foreign invisible college because we are not disposed to spend years of hard work to learn a difficult foreign language without fairly strong assurances that the effort will pay off in due course. I am reminded of my own efforts in college to learn both scientific and literary German, in the prospect that much of the foreign technical literature that I would be reading during my professional career would be in that language. I never had to use my German capability for that purpose... Nonetheless, I strongly support a greatly increased focus on teaching foreign languages in the U.S., starting at the elementary school level and progressing through university training where specialized vocabularies can be learned. However, language instruction must be coupled with education in the culture, history, and economics of the target countries. I see no particular value, for example, in learning to read scientific Japanese without being able to interact politely and correctly at the direct personal and verbal level with the Japanese people. This in turn will be effective only if there is a sensitivity to the Japanese culture, societal characteristics, and etiquette. That is, we must approach our future interactions with Japan in science and technology on the basis of dealing with respected and friendly equals, and not as we did in the post-Sputnik era when scientists and engineers were being encouraged to learn Russian out of fear for the sudden encroachment of a political adversary into our domain.

Lest what I have concluded so far be viewed as too general or even hypothetical, I believe that it would be useful to describe for the benefit of the Subcommittee some of the findings that my firm obtained recently in a study we performed for the Office of Japanese Technical Literature in the Department of Commerce. We were asked to make a survey of the extent to which R&D organizations in the U.S. were making efforts to acquire

information on Japanese science and technology in the specific field of advanced ceramics. This field was selected because it was known as one in which Japan excels and at the same time is sufficiently small to permit obtaining reasonably valid results through statistical sampling techniques. I caution that the results that I present to you should not be extrapolated to other technical fields, since each field almost certainly has its own characteristics in regard to the degree that its scientists and technologists interact with counterparts in Japan. However, the results are illuminating and worthy of careful thought.

By the use of a questionnaire, we polled 100 American R&D organizations selected randomly from a much larger population known or believed to be known to be working in advanced ceramics. These organizations were grouped into the following categories: large private companies, small and medium-sized companies, universities, government laboratories, and not-for-profit research institutes. We also polled separately the 37 member companies of the United States Advanced Ceramics Association (USACA) represented on the Association's Technical Committee. The reason for treating this specialized group as a separate entity was that it gave us a means for comparing results from organizations known to be dedicated to the advancement of the field with those whose interests might be less focused or intensive.

In a previous technical survey, we had been able to develop techniques for increasing the rate of response to questionnaires beyond that normally experienced in this country. In applying these techniques to the advanced ceramics survey, we obtained an overall response of 75% within a prescribed time limit and 80% if late returns were counted. By organizational grouping, the response rates ranged from 64% for large companies to 100% for government laboratories and not-for-profit research institutes. (These techniques were not applied to the USACA members polled, and our response rate here proved to be 46%).

The primary statistic that was developed was learning from the respondents the proportion that had formal programs in effect to follow technical developments in Japan. The results were:

Category of Organization	Percentage with Programs
Large companies	43
Small and medium-sized companies	16
Universities	18
Government laboratories	54
Not-for-profit research institutes	20
USACA members	76

It was anticipated that the smaller companies would be deficient in mounting Japanese technical information programs, if for no other reason

than the cost entailed. However, it was a complete surprise to learn that most of the universities surveyed had no program and that only one appeared to have a relatively large effort. A possible explanation is that university-based R&D programs depend on the individual initiatives of scientists and engineers to collect information of use to them and these programs do not oversee or direct acquisition in a formal sense. If the questionnaires had been directed to the libraries of the universities rather than to senior research personnel, a different kind of response might have been obtained. However, polling libraries introduces other problems of interpretation, such as the extent to which information collected by libraries is actually used.

Those organizations that indicated they had no formal Japanese scientific and technical information (JSTI) programs in effect were asked to indicate whether they had any intention of instituting such programs within a year. It was disturbing to learn that none of the large companies or universities intended to do so, and only 25% of the other organizations stated a positive intention. We were forced to conclude that there is a relative lack of interest in Japanese advanced ceramics technology among those organizations not already having an acquisition program in operation.

Since our final report to the Department of Commerce is over 100 pages long (plus appendices), it is not possible here to cover all of the details we were able to extract from the questionnaires. However, the Subcommittee may be interested in a few of the conclusions reached that are particularly pertinent to this hearing.

* Only large companies and USACA members showed any extensive use of publications that originate in Japan. University respondents appeared to rely entirely on the journals of professional societies for information about Japan. Organizations with JSTI programs in effect used a broad variety of methods to acquire information, with many of these being based on the use of direct personal contacts in the U.S. or Japan.

* Even those organizations with formal JSTI programs invest relatively small amounts of funds to acquire information from Japan on advanced ceramics. For about half of them, their annual investments were less than $1,000. One large company stated that it invested more than $100,000 per year, and one government laboratory reported a figure of between $50,000 and $100,000 per year. Among USACA members, average expenditures were higher than in the other groups. Except for the USACA membership, most respondents indicated that the level of expenditures was about right and that they did not intend to increase their funding of this effort.

* When asked whether the public sector or the private sector should take the leadership role for JSTI programs in the U.S., those organizations with JSTI programs were almost equally divided in their replies. Organizations without JSTI programs opted by a ratio of 60% to 40% in favor of the public sector.

* A substantial body of information was obtained on internal and external obstacles faced by R&D organizations in acquiring JSTI. These

hinge largely on the lack of Japanese language capability among American scientists and engineers, the need for a more organized approach and centralized funding (probably at the Federal level), and problems generated by the protection of proprietary information in Japan.

* Most respondents in all groupings identified competitiveness factors that were more important to the advanced ceramics industry than JSTI. Extensive comments were received about management and financial problems in the U.S., the failure of the U.S. educational system to produce technical and linguistic literates, and the need for better cooperation among government, industry, universities, and the media. The report itself should be consulted for a better understanding of the depth of feeling about these non-technical factors.

* Recipients of the questionnaire were asked to evaluate the present relative (compared to the U.S.) strength of R&D on advanced ceramics in Japan and to forecast this strength for five and ten years from now. All organizational groupings replied that Japanese R&D is at least equal to that of the U.S. at present and that this position will not change markedly in the future. The response therefore tended to validate one of the premises made in conducting the survey.

Finally, the relatively brief conclusions of our report are quoted here in full:

"The general conclusion reached is that U.S. organizations working in the field of advanced ceramics R&D are familiar with the progress being made in Japan but for the large part do not devote a great amount of special attention to collecting, analyzing, and integrating technical information from Japanese sources. For example, it was illuminating to find that very few organizations have joint ventures or licensing agreements with Japanese counterparts, in contrast to other technical fields where such arrangements are widespread. Several of the organizations polled cited how effective the Japanese were in acquiring information on advanced ceramics from the U.S., and how weak Americans are in taking corresponding action. A number of the respondents stated that the short-term nature of the R&D process in the U.S. inhibited a long-range approach that would justify increased expenditures for acquiring and examining technical information from Japan. Even more broadly, the perceived heavy additional cost of obtaining specialized information from Japan in the form of translations of documents or abstracts seems to act as an important inhibition to doing more about following Japanese technical progress. This point deserves special attention by the Department of Commerce and the National Technical Information Service, since the latter is now evaluating the feasibility of establishing a Japanese translation consortium through which translations performed in the private sector or by government agencies other than NTIS would be pooled for the common good."

As the final part of my statement, I would like to address the programmatic options offered by Dr. Hill in Part IV of his report.

Dr. Hill first concentrates on possible Congressional actions that might be taken, after pointing out that after Congress passed the Japanese

Technical Literature Act of 1986, it failed to appropriate the funds needed to implement the Act. The actions suggested by Dr. Hill all require major financial support by the Congress, and I am not sanguine that the Congress will take adequate measures based on its past performance. In my opinion, several million dollars per year are required to fully discharge the many obligations placed on the Government by the Japanese Technical Literature Act alone, taking into account that several of the provisions have not even been initiated because of lack of funds. What is more, there is no assurance that future Congresses will maintain even a minimal level of support; this is an important factor, since it will require several years before the Act will have a significant impact on the supply of Japanese technical information to the public.

Also, most of the proposals by Dr. Hill and others are based to a large extent on the premise that there is a large, unfulfilled demand for this kind of information that is not being met. For reasons already stated, I believe that there are serious doubts about the validity of this claim, but it is probably better to err on the side of supplying too much rather than too little so that this hypothesis is tested.

Dr. Hill also suggests that NSF's efforts to supply information on the nature of R&D in Japan and to support (in conjunction with DARPA) studies of various advanced technologies in Japan might be expanded. Here I fully agree with this proposition, not because I consider it to be an increase in the supply of technical information but because I hope that reports of the kind generated by NSF and its contractors will act to stimulate interest in Japanese science and technology and therefore to encourage a secondary or consequent increase in demand for more detailed technical literature from other sources. Again, the Congress must be prepared to fund such programs on a continuing basis and at a realistic level.

Another legislative proposal that apparently is still viable is Section 574 of H.R. 3, which would amend the Higher Education Act to permit the Secretary of Education to acquire, translate, and disseminate foreign technical periodicals on a worldwide basis. The sum of $1 million per year contemplated for this purpose has to be considered laughable in its paucity, and it might even do more harm than good in that it could cause disruptions in information services already being provided by others.

The suggestion that government subsidies to professional societies and other non-profit organizations would serve to increase the importation of foreign technical information is no doubt valid, but this proposal -- like all others designed to augment the supply of information -- does not address the real issue: whether the additional information will be read, and if it is read, whether it will be used effectively. I have discussed the problems entailed in digesting information previously, and I reiterate that more attention should be paid to the causes of the lack of demand for information and how they might be overcome.

An attractive -- but also a very expensive -- way of increasing demand is to facilitate person-to-person contacts by American scientists and engineers with their foreign counterparts. This is the way current

technical interchanges are established and maintained. In November of 1986 I proposed at a conference on technical cooperation with Japan that the private sector take the lead in this regard by initiating a program under the auspices of the National Academies of Science and Engineering wherein each of the Fortune 500 companies would sponsor a year of study or research abroad by a promising young professional. Such an effort would be similar in scope and magnitude to that carried out by Japanese organizations for decades and would raise the level of American sensitivity to foreign research and development in truly measurable amounts. Presumably the participating corporations and the individuals would be the immediate beneficiaries of the investments, but in the longer term the nation as a whole would benefit from a more international outlook. Up until now my proposal has met with a resounding silence.

Dr. Hill proposes that the Government subsidize the cost of foreign travel by scientists and engineers and provides excellent arguments for and against this practice. However, some differentiation is needed in justifying the types of travel. If we again look at Japan as the target of opportunity, we find that relatively large numbers of American technical professionals go to Japan to attend a conference, to pay a short visit to a research facility, or to participate in contract negotiations. The number who take up residence in Japan for research or study for a period of months to years is abysmally small, and not because there are openings for such people. A careful study by NSF has indicated that private companies in Japan would welcome visiting scientists or engineers and in some cases would offer permanent or semi-permanent employment. In addition, Japanese Government research institutes and universities have changed their regulations and policies to permit the use of foreign researchers, although there has been only a token effort to carry out the more liberal policies. However, Americans are not applying for these positions. Academic scientists fear that their path to tenure in their home universities will be irreparably damaged, and they are also concerned about the financial and personal problems entailed. Corporations fear the brain drain syndrome or that their employees will give more information to the Japanese than they obtain. Fortunately, there is some light being shed on this issue by the programs established during the past few years by MIT, North Carolina State University, and a few other academic institutions, whereby undergraduates in science and engineering are given Japanese language training and an education in Japanese culture and history, followed by a year of residence in Japan at a university or private company. Even in these attractive ventures it is sad to note that the much of costs of residence in Japan for this new breed of American are being borne by the Japanese, and the programs would fail if they depended completely on American funding.

In a related manner, a few American industry associations and government agencies are providing fellowships for study in Japan, but the number of technical personnel that can be supported is too small to make a large impact on the state of our knowledge of Japanese technology. In all frankness, I do not think that the U.S. Government -- either the Congress or the Executive Branch -- is prepared to foot the bill for even 100 people in this regard.

Dr. Hill's estimates of the costs entailed for these and other programs designed to place relatively large numbers of Americans in Japan are probably too low. In a conversation I had recently with an American engineer living in Tokyo and working for an American telecommunications company, I surmised that it probably cost $200,000 per year to maintain a middle-level professional there, including salary. The response was that the figure is more like $300,000 per year.

Well, if neither the U.S. Government nor the private sector is willing or able to provide the finances for on-the-scene access by Americans to the Japanese technical milieu, is there another option not yet mentioned? I think that there is, and it is one that is being quietly exploited by an increasing number of American corporations. They are primarily the multinationals or large manufacturers who view Japan as important enough both as a potential market and as a source of advanced technology to invest heavily in establishing R&D facilities there. This burgeoning phenomenon has attracted almost no attention in the U.S. and so far has been essentially ignored by protectionists. Some examples will suffice to demonstrate the size and extent of this approach.

IBM has operated a large development laboratory in Japan for decades; it has supplied new hardware for IBM systems throughout the world. Recently IBM has consolidated and expanded its Japanese R&D operations and has added a new science center in Tokyo.

Dupont has built a new technical research institute near Yokohama at a cost of over $100 million. It employs 180 research personnel, with this number scheduled to increase to 300 in the next few years.

Among other chemical companies, Eastman Kodak is planning to construct a large research laboratory in Japan after doing business there for more than 90 years. W. R. Grace has just completed a large research facility and Upjohn will have a research staff of 400 working at its new laboratory by this coming summer.

In the electronics field, the U.S. semiconductor company LSI Logic has opened a small research laboratory in Tsukuba Science City. Motorola, AMP, Intel, Digital Equipment, and other U.S.-based companies also perform electronics development work at their Japanese subsidiaries. Texas Instruments, long embattled with its Japanese competitors over patent rights and market share problems, has decided to build a 580,000 square foot research center in Tsukuba. Unisys is employing a somewhat different approach: its joint venture with several Japanese partners, Japan Univac, is completing an artificial intelligence center in Tokyo at an estimated cost of $200 million and employing more than 1,500 research personnel.

While it is easy to characterize these moves as being in the category of "If you can't beat 'em, join 'em...", the motivations are more sophisticated than this. These R&D ventures will employ mostly Japanese professionals, so they will be able to tap into the complicated technical environment that exists in Japan and to maintain a current awareness of what is going on there. Also, the American companies will be better able to to meet Japanese consumer requirements and to conform to the strict

standards for quality and performance that are characteristic of the Japanese market. Finally, the American companies see process and product development in Japan as a good test bed for entry into other Asian markets.

In contrast, the number of Japanese research laboratories that are in operation or planned in the U.S. is much smaller and they are also smaller in size and scope, so symmetry in this particular aspect of technology transfer appears to heavily favor the U.S.

While conducting R&D in Japan is no panacea, it does offer a scale, intensity, and continuity of effort that is not matched by the other avenues that have been the subject of so much discussion and so little funding.

I would be remiss if I did not conclude this statement by expressing my concern about protectionist sentiments both within and outside the Government that have been reflected in legislation already passed and in legislation still pending that bear on the international transfer of technology. Attempts to restrict the flow of unclassified, non-proprietary technical information for economic reasons from the U.S. to other countries, either in the name of a distorted view of the symmetrical access concept or in the guise of national security controls are bound to backfire. One must be paranoid to accept the premise that we should be able to demand access to technical information in other countries while withholding our information from them, notwithstanding our history of openness and our willingness to share the results of our scientific research. We are inviting retaliation if we pursue this course, just at the time when we have the most to gain from the technological advances being made abroad. I refer the Subcommittee to the article by Professor Robert Reich in the May 1987 issue of The Atlantic Monthly, entitled "The Rise of Techno-Nationalism", for an exhaustive treatment of this subject.

Symmetrical access should be defined more clearly in the terms that were visualized originally by the National Academies of Science and Engineering in their consideration of U.S. relations with Japan. That is, the term was coined to describe a process that would counteract protectionist tendencies in the U.S., not to reinforce them. Where heavy imbalances due to cultural or institutional impediments exist in the numbers of scientists working abroad, in the flow of published information, or in access to government laboratories, for example, attempts should be made by both parties in a cooperative and enlightened mode of negotiation to raise the level of involvement by the country perceived to be deficient and not to take unilateral punitive steps to reduce interactions to an equal level. Thus the concept of symmetrical access implies that a positive sum game is being played, whereby both countries ultimately benefit from the actions mutually agreed to and put into effect.

Mr. HALL. Thank you, Mr. Bloom. The Chair recognizes Mr. Satoh.

Mr. SATOH. Well, I thank you Chairman, for the opportunity to testify today. My testimony might be somewhat different, because I represent the commercial sector so to speak, and I would like to talk about my own experience, which should be illuminating in some ways about the state of Japanese technical information in the United States.

The program that I originated back in 1983, is a program to bring a large amount of Japanese technical literature information from Japan to the United States. And as Senator Rockefeller remarked, yes indeed, there are more than 10,000 technical journals being published in Japan, and very little of that is being translated or abstracted into English today.

And if I can throw some of the figures at you, approximately 20 percent of the 10,000 might be picked up in English, in one way or another, but usually selectively. And if you look at the articles themselves, my estimate is about only 7 percent of the journals are, in effect, being picked up by western sources. But some of that is not even being done by your western sources, actually. Some of them are even being done by the Japanese themselves, in their effort to disseminate the information abroad.

And I wholeheartedly support the remarks made by other parties about the openness of the Japanese society with regards to the Japanese technical information. The information is there, if you only know what to ask for and if you're willing to ask for it and if you're willing to get it. So, I think the issue of Japan's closedness, as far as technical information is concerned, is very much behind us.

There is no question that Japan is open. There are some minor technical issues and there might be some difficult people to deal with, but in principle, it's a very open society.

Anyway, back in 1983, at the request of U.S. industry, I started the program. I designed the program, recruited the people, and started up the program finally, with funding from Xerox Corporation, at the beginning of 1985. The process itself was rather difficult because of the lack of experience in this field in the United States, but we somehow managed to put together the staff and worked out the logistics and put the product out in January of 1986.

Now, that effort was based partially, of course, on the recommendation of industry people, including such prominent corporations as General Motors, Ford, IBM, Xerox, Proctor and Gamble, Dupont, Dow Chemical, et cetera. And their remarks were that they felt they needed the information, and therefore they wanted somebody to start it. And I was naive enough to take up on their offer, and put approximately five years of my life into it.

We also conducted a marketing study, surveying corporate libraries and actual engineers. And the results were, we felt, very encouraging. Many of them felt Japanese information was valuable and important to their research, and more importantly to us, were willing to purchase such information, if we came up with the product. So we did.

And we showed the product finally in 1986, and we started marketing. The initial marketing went very well. A relatively small group, but a group of large corporations signed up and purchased the service. And they really haven't changed their opinion abut the quality of the product. We have been praised for the quality of the product, not only from librarians, but from engineers and some corporate executives as well.

But the sales have sort of leveled off. You might say that, beyond the Fortune 200 or 100—however you draw the line—level, beyond that, the interest was not really there. And if I go into details, our marketing effort involved a process like this, typically: first of all, we have to identify the right department within large corporations. All by itself, it's very difficult, not just for a Japanese product, but for anything else. But we have to go through the standard process of identifying the right department, the right person. And then we found out, it's not enough to convince one person within the corporation when it came to Japanese information. And we had to talk to sometimes, oh, two dozen people in the same company, and tell them, here it is, the product, and you expressed your interest.

And sometimes we have to put the whole people in a room and ask, and so what do you say for a $5,000 product? Would you like to make a decision? It's much easier to make a decision for a $5,000 car—one person can usually make the decision. But we had to go through the whole process. It might require 3 to 6 months to sell that product. And some of them might say, yes, we think it's important to use Japanese information, but when the time comes to show their real intent and conviction, it was hardly there. And that's our experience.

Below the Fortune 200, of course, the financial issue was there, but the organizational issue, I think, was there. Those companies are not really well-equipped to handle, not just Japanese information, but any kind of information. There's no systematic way for many of them of collecting such information. That's a problem from an information program provider's standpoint.

So after the three years of marketing, the corporation—the company, University Microfilms, has finally come to the decision that the market at this point is not there for the product, and they are considering shutting down the operation. I believe it is at this point the largest body of science and technology information, Japanese science and technology information available in the United States in English. It is accessible, totally accessible, so physical accessibility is not an issue. If you are willing to pay $30 for a computer search, you can access it from anywhere. But I think the conviction issue, that we talk but nobody is really willing to show their conviction—that is my feeling.

The cause for that I can speculate, and a couple of things that—this is sort of an old notion, and it is nothing new, but I remember back in 1983 the same thing was discussed by probably the same people, and so the situation hasn't changed very much in the past five years. Language education, for one thing, was mentioned, and it was recognized by everybody as one of the real solutions. If you put your money into it and if you can educate enough people, then you definitely develop the capability to access and the actually access itself, but for whatever reason, that was not implemented.

Maybe people are too impatient. Maybe five years or so or whatever, they thought—maybe three months, they thought that was too long.

We are facing the same situation today and when do we begin the process? It seems like we have to get that started right away. Also, Senator Rockefeller mentioned that there are a lot of Americans today who are quite proficient, and sometimes even more fluent than I am in the Japanese language, and they are being severely under-utilized. In my office I get calls from some of those people a couple times a week asking me if I can think of anyplace for them to put their knowledge and experience to good use, and I can't think of anyplace. I always recommend them to Japanese corporations. They are willing to take Americans in because they know they can benefit by being exposed to a different culture and different thinking. But American companies? Who is willing to take those people? They say, well, that's nice but language we don't need. We need an MBA.

So that has to change, and I can't estimate the actual number of such bilingual people. I am not talking about technical bilinguality, but bilinguality in general, and I think there might be several hundred, maybe even several thousand Americans who are ready to serve if they were asked to. Frequently they are quite brilliant, because those people I know, they are interesting people. They are smart people, and they devoted their time—five years, ten years to the study of language. If they are asked to perform, they'll perform and I think American corporations must change their thinking in that, and look at those people and find the ways to use them effectively. Those are the two things that I can think of that Government might be able to get involved in some ways. On the cost of that I don't want to speculate, but I can think it is very minor if you are committed. If you are committed it is millions of dollars lost, you might say, in expense.

So I think the issue really is that of conviction. Are you really convinced that—are you willing to put Japan a priority today, and if you are not, then you really should back out of it and see what happens.

From the Japanese standpoint, I think Japan made that decision several decades ago, and it is very clear, not only in the government but in each individual corporation, the educational system itself, it recognized the importance of foreign information and the Japanese spend the time and have spent the time and money to make that flow of information happen from the United States to Japan. Rockwell might have three people in Tokyo, but Mitsubishi in New York—they have 300 and there are several dozen companies with the same number. I agree with the other witnesses about the importance of having the actual bodies in place, but I don't know if the United States is willing to cultivate that human resource—that is a must that this country has to do in my opinion.

That is my testimony. If I may answer any questions?

[The prepared statement of Mr. Satoh follows:]

First Priority: Get America Ready to Access Japanese Technical Information

Tomoyuki Satoh
President
T. Satoh & Co., Inc.
1850 M St., N.W., Suite 1050
Washington, DC 20036 USA
202-785-1160

Experts today point out that businesses must compete and cooperate globally if they are to survive and grow. We are now entering a new era of worldwide competition and cooperation, an era in which I hope people will work together toward higher levels of mutual understanding and prosperity by leaping across the language and cultural gaps. At the conclusion of this "globalization" process, there will simply be companies competing worldwide, and it will no longer make sense to call them "American" or "Japanese," even though many of them may still bear their original names indicating their ancestry.

As we enter this new era of worldwide competition and cooperation, how prepared are we? Do we understand each other well enough to enter into successful competitive-cooperative relationships? The dramatic surge of competitive threat from Japan over the past few decades leaves us with very little doubt that the U.S. will continue to lose its competitive position in the world marketplace in the years to come. Unfortunately, however, the flow of information has been historically so one way -- from the U.S. to Japan -- that American businesses are entering this new era without the benefit of basic understanding of their potential Japanese competitors or partners.

From a historical standpoint, for nearly three decades, the Japan Information Center of Science and Technology (JICST), an agency under the jurisdiction of Japan's prime minister's office, has been gathering, abstracting and translating research and technical information from the U.S. (and elsewhere) into Japanese and making it widely available within Japan. Similarly, MITI's research arm, JETRO, has also been systematically gathering foreign technical and business information for Japanese businesses. Although such government operations are still relatively significant, they are by no means the only way Japanese businesses acquire foreign technical information today. In fact, the bulk of foreign technical information gathering is now being conducted by individual Japanese corporations themselves. They collect information directly through their foreign listening posts and through their research and planning departments that access foreign electronic databases and subscribe to large numbers of foreign technical

publications. In addition, Japanese researchers themselves regularly read foreign (usually U.S.) technical literature, as well. In short, Japan has long recognized the value of strategic information gathering, and has invested its resources to collect and disseminate the information. In other words, Japanese businesses today are prepared to access foreign (U.S.) information: they have both the willlingness and resources at their disposal to access and interpret foreign information.

By comparison, even today, very few Americans are proficient in Japanese, and even fewer Americans comprehend technical Japanese. This problem has remained unaddressed by the Congress for the past five years, despite the recognition of the problem at numerous private seminars and Congressional hearings during this period. I estimated the number of qualified technical Japanese-to-English translators available in the U.S. at 400 (rather optimistically, I might add) in 1985, and the figure has been quoted since in numerous newspaper and magazine articles. My current impression, unfortunately, is that the number has not grown significantly in the past three years. Therefore, even in cases where it may be economically feasible and there may even exist an inclination to do so, individual American corporations may not be able to collect and disseminate Japanese information on their own very effectively. From a cost standpoint, according to a recent estimate, stationing one mid-level executive in Tokyo can now cost an American corporation $250,000 or more per year, thanks in part to the devaluation of the dollar. By comparison, much more wide-ranging information gathering activities can be carried out effectively, at a fraction of the cost of operating a dedicated office in Japan, by a specialized group of professionals serving a multitude of clients. This thought prompted me to create Japanese Technical Information Service (JTIS) five years ago. The mission of JTIS was to reverse the historically one way flow of information -- this time from Japan to the U.S.

As we all know, Japan is both a voracious consumer and prolific producer of information. In the technical literature field, Japan today publishes an estimated 10,000 technical periodical titles per year. However, several studies since 1980 have shown that, prior to the advent of JTIS, less than 20% of those estimated 10,000 Japanese technical journal titles were being abstracted and indexed by Western information providers. Furthermore, a closer look at the 20% covered by Western sources revealed that articles were covered only selectively, with a heavy preference for those that had English author abstracts and/or those published originally in English, thus reducing the effective coverage rate, at the article level, down to perhaps as low as 7%. Thus, an abundance of information was openly available in Japan, but very few efforts were previously made by American and other Western corporations to actively take advantage of the information available there. In fact, on an annualized basis, the JTIS program has almost doubled the amount of Japanese technical literature information available in the West. JTIS covers virtually all research, technical and management areas, with emphasis on areas where

Japan is recognized to be on the leading edge. Simply put, the JTIS program represents the single largest American effort in the '80s to comprehensively monitor Japanese science, technology and business activities. Journals covered by the database include those produced by commercial publishers, corporations, professional societies, universities and the Japanese government. JTIS' cover-to-cover coverage policy, i.e., picking up every article of substance in every journal issue, is unique in the industry: conventional information services provide coverage only selectively based on their own pre-determined criteria. Because of this editorial policy, despite its primary focus on Japanese science and technology, the JTIS database embodies a unique single comprehensive source of information on contemporary Japanese business and culture as well. Depending on users' information needs and internal computer capabilities, the database is available in any variety of forms. JTIS on magnetic tape will enable a corporate user with national or international computer networking capabilities to disseminate strategic Japanese technical information to hundreds or even thousands of key managers. Medium-to-small orporations without extensive computer networking capabilities can take advantage of monthly abstract journals, or electronic database through DIALOG -- in which case the usage fee may be as little as $30 per online access.

However, although the JTIS database has been praised for its quality, usage of the database by American businesses has been significantly below expectation. Marketing of the JTIS program for the past three years has identified American businesses' lack of experience in accessing Japanese information and their lack of internal human resources for interpreting Japanese information to be a difficult barrier to overcome. While lack of means for access has long been cited as the cause of the U.S.-Japan information flow imbalance, I now believe, especially after the JTIS "experiment," that the real cause is the unpreparedness of American businesses: in a narrow sense, America is unprepared to access Japanese information for lack of necessary human resources capable of effectively handling Japanese information; but in a broad sense, I would even venture to say that America is perhaps unprepared and unwilling to even recognize the need for developing such resources. In this regard, the recent surge of reporting on Japan by the media may give you an impression that America is finally getting itself ready to face Japan, but I must say that the reality is significantly different. Japanese information access in real terms will never take place, no matter how many means for access may be developed, until finally American businesses become willing and ready to use the information. This, I believe, requires significant attitude changes among American businesses (e.g., choosing long-term growth over short-term profit, developing management-labor cooperation, etc.), and perhaps even in the American society in general (e.g., recognizing the value of language education, choosing steady growth over quick prosperity, etc.). However, bringing about such changes may be beyond the capability of any single informaion provider, or even a collection of

providers. Therefore, I believe the U.S. government has an important role to play in bringing about the changes which are necessary before successful access to Japanese information can take place. In this regard, I believe that the Japanese Technical Literature Act enacted by the Congress is a step in the right direction. The Act, carefully and wisely crafted to avoid direct competition with information providers in the private sector, helps American businesses access Japanese technical information by exposing them to various Japanese information resources available. The U.S. government could play a greater role if it were to consider implementing additional measures to encourage American businesses to develop their preparedness. Some of the possible measures have been identified by Dr. Hill of the Congressional Research Service (CRS) in his report on the subject, including, but not limited to, such measures as offering tax incentives to businesses in exchange for the use of Japanese information. I believe the private sector is both strongly interested and committed to "bridge the information gap" between the U.S. and Japan, and firmly believe that once the market is ready to access Japanese technical information, the private sector will respond quickly to fill the need with innovative information products and services.

I would like to thank the Subcommittee on International Scientific Cooperation for this opportunity to testify, and I will look forward to working with the Subcommittee in the future on ventures to improve U.S. access to Japanese technical information.

Tomoyuki Satoh

EXPERIENCE

* T. Satoh & Co., Inc., Washington, D.C. November '87 - Present. Founder and President.
* Bell & Howell Co./UMI, Ann Arbor, MI. January '86 - October '87. Manager Business Development, Japanese Technical Information Service (JTIS).
* Xerox Corporation/UMI, Ann Arbor, MI. June '84 - December '85. Consultant, Co-founder & Associate Director, Japanese Technical Information Service (JTIS).
* Japan Information Service, Austin, TX -- August '81 - December '84. Founder & President.

EDUCATION

* The Univ. of Texas, Austin, TX. Graduate study in architecture.
* The Johns Hopkins Univ., Baltimore, MD. MA in physics.
* Furman Univ., Greenville, SC. BS in physics.
* Science Univ. of Tokyo, Tokyo, Japan.

PERSONAL PROFILE

* Satoh, born in Gunma Prefecture, Japan, in 1954, has been a U.S. resident since 1976. His grandfather, the late Mr. Kaiji Ishiwara, was a two-term senator and chairman of the Liberal Democratic Party (LDP) of Gunma Prefecture - the home state of former prime ministers Mr. Yasuhiro Nakasone and Mr. Takeo Fukuda. Satoh enjoys a very close friendship with Mr. Fukuda.

Mr. HALL. Yes. Thank you, Mr. Satoh. I might say that I didn't notice to welcome you on behalf of our alma mater, which I should have. Mr. Fawell, would you like to start the questions, or do you want me to kick it off?

Mr. FAWELL. Either way, Mr. Chairman, that you want to do it.

Mr. HALL. The Chair recognizes you for as much time as you require.

Mr. FAWELL. I thank you. I know as Dr. Hill was testifying, and this area of inquiry is relatively new to me, I couldn't help but think to myself it is just elementary that before one begins research and development on a given topic that you make every effort to find out what is known elsewhere, and not just reinvent the wheel and so forth and so on, and Mr. Smith, I note that you had said that Rockwell's interest in foreign technology was not unique at all, or maybe you meant not unique to Rockwell. Are there other companies that you feel do have a physical presence in Japan and other countries, and are following that lead?

Mr. SMITH. Yes, there are some. They tend to be larger companies, though. For example, in Tokyo the American Chamber of Commerce in Japan has been very active. There is an R&D committee that the head of our office there chairs, AT&T, General Motors, Dow, mainly larger companies, are doing things similar to what we are doing. Certainly we don't have 300 people as Mitsubishi does, but we are up from zero at least.

Mr. FAWELL. Why is this? I think everything I have been hearing is that U.S. business is, even considering that we do have some presence in Tokyo, for instance, as has been stated, Mitsubishi has 300 in New York, all of what I hear is that U.S. business is relatively lax about this. Why is this so?

Mr. SMITH. Well, I think we are probably thinner in terms of head count. I think one reason there are so many Japanese in the U.S. seeking out American technology is because of the activity of the Japanese trading companies, which are really in the brokering business. They buy and sell information as well as commodities, and I think a lot of the activity in the U.S. is because of the trading companies.

There is not such an analog in the U.S. that I know of. We don't have U.S. trading companies who are in the business of brokering information, scouring the rest of the world, as the Japanese do. I don't know why that kind of activity has never developed, that kind of merchant activity, but it doesn't seem to.

Mr. FAWELL. Do any of the other participants have something to say in this regard?

Dr. ROY. I think what Mr. Satoh said was very important. It is a matter of commitment. I think here Mr. Smith has referred to the corporate world. It really has not seen the value. This was because we got fat and lazy. There was a time when the U.S. so dominated the world in science and technology, 50's and 60's, that we really didn't look abroad, and we thought, well, that will go on forever. Some of the curves I showed in my testimony, that's crossed now. Most of the world's scientific literature is being produced elsewhere, and technology even more, but we have gotten into bad habits.

Mr. FAWELL. But you think of the U.S. companies, though, of being very capable and willing to exploit an advantage, and it would seem to me that that is—I'll go back to my first statement. It is elementary that there is a great deal of knowledge there to be gained, technical knowledge, and there may be difficulties insofar as finding translators, although Mr.—is it Satoh?

Mr. SATOH. Satoh.

Mr. FAWELL. Mr. Satoh has indicated, no, the translators are there, for instance. It troubles me that when we talk about competitiveness, and time and again it seems to me it is the American culture that just is holding us back in terms of not wanting to work cooperatively with each other, for instance, to do things as the Japanese are culturally, perhaps, more able to do, then I find that we still have the attitude, well, we were on top for so long that we can't break away even when it must be clear that there is more dollars to be made. You are going to be more successful if you're aware of what your competition is doing and how they are doing it and how they are out-competing you.

Dr. ROY. Mr. Fawell, you know I think you have a bully pulpit, Mr. Chairman, and I think one of the things that the Congress must seize is to really press us in the technical communities to change that culture. My perception in the materials field, which I know pretty well, is that many of the companies have given up. I mean, in a sense, when we come out with two or three university professors and R&D chiefs from corporate labs, we come out to Matsushita, out of penance to Sumitomo or something, we just say we are going to surrender now, don't shoot, because, in a sense, the commitment of the Japanese corporate world to R&D on a 20-year time frame is there.

We have no similar commitment in any corporation in the U.S. that I know about in the commercial sector that can really—I mean, we were the pride of the world in the General Electric research lab, which was the head of material science. But it is not there—the commitment is to short-term profits, off-shoring production and doing the right thing from the corporate viewpoint, which is maximizing profits. But that is not serving the nation. I think the Congress is confronted with a new situation in the public/private sector mix, an interaction to bring a product to market, and that is a cultural problem. Mr. Satoh, I think, has referred to the same thing.

Mr. FAWELL. And the race toward competitiveness now is causing us to look more and more short term. We are interested in something that can turn a profit and will be picked up commercially very quickly. I'll bring in the superconducting super collider—that is too far away, that type of basic research, to think in those kinds of terms, unless we want to avoid that, and we cheat our children 20 years or 25 years down the road simply because we won't invest, and we'll give them the bill instead for the deficit we produce.

I felt that corporate America was beginning to wake up in terms of quarterly profits being the only thing, and that perhaps Wall Street can recognize a good bet when they finally see an entity that is going to be looking to the long-term for profits, but we aren't even smart enough to go out and steal them. I don't mean that in the literal sense, of course, but here we can't even recognize

that, hey, there is an ability to get out there, make your presence felt. In every lab in America there are many foreign participants and we welcome them, but apparently in Japan that is not—I think they would be welcomed, I would gather, but Americans are not there participating in the Japanese culture, growing with it, although you say Rockwell is certainly beginning to, Mr. Smith, to recognize that.

Mr. BLOOM. Mr. Fawell, if I could add a few comments to what has been said, Senator Rockefeller mentioned an important point and that is the nature of business management in the U.S. compared to Japan. There is greater emphasis on technical knowledge on the part of senior managers and corporate officials in Japanese companies as compared to the U.S., and one reason why that is important is that American companies, as they move toward short-term profits and quick return on investment, affect how R&D is managed in American companies. So their laboratories also begin to look for quick fixes, and can't obtain money, in fact, to carry out five-year, ten-year programs, as Rusty was saying.

If you extrapolate from there into the field of acquiring technical information from other countries, that is only effective if you are carrying out long-term R&D because you don't know what you are going to come up with when you set out to look for what is going on abroad. You just have to have a process that continuously absorbs, digests and integrates foreign information into your own R&D program without knowing in advance whether it is going to help you or not.

That means that you have to spend money, then, for that on a long-term basis, and that, I think, is where Tom Satoh gets into trouble when he tries to get companies to invest in acquiring foreign technical information. If you think it is a problem with big companies, it is a much worse problem with small companies because small companies don't have the luxury of having an even higher proportion of their R&D funding going into this gamble of trying to search out what is going on in the world.

So what this country really needs is a different way of looking at industrial R&D and going more toward the long haul and less toward the short haul. It may not produce spectacular results this year or next year, but ten years from now it might. But that is not either politically or economically attractive.

Mr. FAWELL. The lamentable thing, it seems to me, is government is less and less interested in the long-term R&D. Business doesn't seem to be interested in that, and we are not even interested in going out and at least being able to ferret out what our competition is doing in terms of long-term. We are just not interested in long-term at all. It is nothing but the short-term, get-rich-quick blasphemy, perhaps.

Thank you very much, Mr. Chairman.

Mr. HALL. I think each of you gentleman have extensive experiences and professional background relating to Japan and our trade policies, our trade problems, our pursuit of technology. I think Mr. Smith was the one that—I am sorry, Dr. Roy, that I was voting and didn't get to hear your testimony but I will read it. You cited the taxation issue as a real obstacle to extended stays by U.S businessmen, and you advocated some negotiations with Japan to produce a

tax treaty that might allow the U.S. or expatriates to be taxed at a more favorable rate.

How likely is that? I think it is a good suggestion.

Mr. SMITH. I don't know. I would like to hope it is very likely.

Mr. HALL. What do you think, Mr. Satoh?

Mr. SATOH. About the taxation issue?

Mr. HALL. Yes.

Mr. SATOH. Well, that is part of the picture, but I think if you are paying those folks in U.S. dollars, it was partially the working of the American Government that made the cost much higher. I don't know.

Perhaps Japan should bear the burden of encouraging Americans being in Tokyo and their presence felt. I think it is in the long-term interest of Japan itself to further internationalize its market, and that is really the long-term goal of Japanese industry and government itself. So I believe that a tax treaty of some sort should be worked out, and perhaps Japan should bear some of the tax burden for certain Americans.

Mr. HALL. You supported Dr. Hill's suggestion to offer tax incentives along some lines.

Mr. SATOH. I sure do, but only to the extent that produces a result. I don't want to see a bill that will say, okay, if you are an American company using Japanese information, we will give you a tax incentive, and then nothing happens. I don't want that.

It has to be coupled with some kind of effort that would make Japanese information services in the United States much more visible and aware, such as the program that he talked about, the training program. Maybe not NTIS, maybe somebody else, but some kind of awareness training program nationwide pointing out the fact that there are so many services both from the government sector and from the private sector available and/or being introduced in the near future. I think government can take an active role in that.

Mr. HALL. You men are all obviously—maybe I am not saying this right—admirers. You are not Japanese bashers. You have been in business over there, you have opened offices over there, I think Mr. Smith opened Rockwell's technical liaison office there, did you not, and I think Mr. Bloom was a former science counselor at the embassy. I have not had that kind of experience, but I have been in business in Japan, in the aluminum business and in the cattle business over there, and I have great admiration for the Japanese people.

I wonder, though, sometimes when we talk about short falls in demand for foreign technical information and the lack of money and the lack of will of the U.S. Congress to support those pursuits, if we really shouldn't hold a hearing sometime and talk about changing some situations with this country and Japan as they relate to the U.S. defending Japan under the treaty MacArthur entered into with them 40 years ago. It was good then, but I don't really see that it is good today for Japan or for this country.

It is costing us about five or six billion dollars a year, and I don't know if Japan really believes we could come to their aid if anything happened, but they have got a 750,000 standing army in Korea there that are not exactly admirers of Japan, about 22 Rus-

sian divisions that I think have always feared Japan. I am an American that is not afraid for Japan to defend their own shores and gear up again. They could never be Communist. They are aggressive economically. They are one of the leaders in the world.

So how do you put yourself in the position of not being a Japanese basher and yet saying they ought to defend their own shores? That would really hit at the root cause of a lot of the money that has been moved out of this country into that country. True, we get something for it. We received some benefit and we have bases over there. I don't say to do it overnight but to stage it.

If I were a businessman in Japan or in the Diet over there, I would certainly be moving toward suggesting that to this country. You know, it is five or six billion dollars a year. We talk about the Super Collider. That is a Super Collider with a half-billion dollar tip.

I think one of these times we are going to have us a hearing. I may be wrong in what I am saying, but that is what I glean from people like you that come and give your time and testify and that we get to talk to and people that write me. It is a piddling amount, really, that you are suggesting we spend to bring us abreast, and yet we have experienced that Congress has not been willing to do that.

I think we certainly will take your suggestions and will review them. U.S. science and industry ought to do more to take advantage of international technology. It just makes good sense to do that. You have given us many good suggestions here in regard to today's hearing. I don't even mind you taking a shot at the comment I just made. I didn't mean it as a Japanese basher. I am a Japanese admirer and I think they could very well be one of the best allies we have anywhere in the world.

Do you want to leave that alone or do you want to address it?

Mr. BLOOM. I don't mind tackling you on that, Mr. Hall, and I really won't tackle you.

Mr. HALL. I understand. I have been tackled before, and I fall hard and I bruise easy.

Mr. BLOOM. I have been a long-time student of Japan in the cultural and historical and even in a defense sense, so I am very reactive to what you have just said, but at the same time, I am no expert. What I do do is observe what other people are saying, and there are many people in this country and many people in Japan who think that it would be an absolute disaster to rearm Japan, to make its military strength be the equivalent of that of the United States and the countries of western Europe.

The problem is that Japan could never do this with purely conventional forces as it had in World War II. It would have to go to the more advanced weapons systems that are the arsenal of NATO.

Mr. HALL. We have some for sale.

Mr. BLOOM. Pardon?

Mr. HALL. And we have those for sale over here.

Mr. BLOOM. Not the ones I am thinking about, namely, the nuclear weapons systems. This would, I think, cause such a furor in Japan. The idea of Japan even having a small nuclear weapons force—probably, I would think, Mr. Satoh could give a better

view—could lead to the complete political disruption of Japan, causing revolution and who knows what.

The anti-nuclear feelings in Japan amongst the general population are so strong that the appearance of a conservative, militaristic government again in Japan would lead to, I think, unpredictable but horrible consequences.

Mr. HALL. They were very adept at making war, and they are number one, probably, in the world today technology-wise and production-wise. Really if Red China and the USSR are our real enemies, they certainly know how to address those two nations historically. This seems to me to be a great bulwark against Communism in that world, but I am not a military expert and I don't take these junkets and come back an international scholar. I just know what I believe, and I know as we sit here today we have aircraft carriers and airplanes that are flying vectors over there at great expense pursuant to the agreement made in 1945 that was good then, but it seems to me we have outdated it.

Just like the NATO thrust. I think we could do a lot of correcting there, and the people in the think tanks here in Washington tell us that is yesterday's defense. We have got to go to looking at some of those things to where we will have money to afford budgeting the needs that you-all have very ably pointed out today would be in the interest of the American people to do. Yet, we don't do that because of the vast outlay that we have.

It is almost trite to say we spend 7.2 percent of our gross national product on our defense and the defense of others, with them spending less than a half-percent on theirs, and may lose Lone Star Steel in Texas down there, and textile mills shutting down. It just seems to me that the money they don't spend on their national defense they subsidize their industries to our detriment, and we can't get a piddling 35 or 40 million dollars to help technology-wise.

It looks like there is ground to explore something there.

Mr. BLOOM. You know, you might have something that would be in the purview of this committee. I don't recall that it has ever been addressed before. The Japanese have these marvelous technological competencies, and we have an agreement between the U.S. and Japan to cooperate in the development of defense technology. The agreement has been essentially inactive. It was negotiated with great pain but nothing much has happened as a result of it, and if you think the NIH syndrome is bad in industry, you ought to look at it in the defense establishment.

I think Japan could contribute a great deal in terms of helping through its electronic skills and other skills related to this to augment our military capability. Unfortunately, if you go to the next step and say, well, let them pay for the production of some of the military hardware, produce it in Japan for NATO forces or for U.S. forces or the Japanese themselves, then you begin to get arguments from people who fear that the Japanese will then begin to dominate the world munitions market as they have the commercial markets with the high quality of their products and advanced technology.

So there are many controversies that swirl around this whole business of the equivalence of Japanese military investment or lack

thereof and their commercial strength, and some of your colleagues are very interested in this particular subject.

Mr. HALL. I certainly know of their interest. In the last 20 years before I came to Congress, as an attorney I dealt with technical assistance agreements basically with the Japanese. I would see them take one of our store fronts or patio doors or windows and take it from our little plant there and, by the time they got to the airport in Dallas, they had improved on it.

I think your testimony is well placed here, and Mr. Fawell, unless you have anything further?

Mr. FAWELL. No. I thought there were a couple of good tackles there, though.

Mr. HALL. Yes. I will just about get traded for a future draft choice for even bringing it up, but it is something that is on my mind.

I would like to visit with you men sometime at a later time, if I might. On behalf of the committee, let me tell you we really appreciate your knowledge and your dedication and your willingness to share your time with this committee. We will review the record and see what it can do legislatively to help move things along.

Thank you very much. We are adjourned.

[Whereupon, at 4:06 p.m. the Subcommittee recessed, to reconvene at the call of the Chair.]

APPENDIX I

ADDITIONAL STATEMENTS FOR THE RECORD

STATEMENT OF

MR. RICHARD J. SMITH

ACTING ASSISTANT SECRETARY

BUREAU OF OCEANS AND INTERNATIONAL ENVIRONMENTAL

AND SCIENTIFIC AFFAIRS

DEPARTMENT OF STATE

HEARINGS ON THE IMPLEMENTATION OF

THE JAPANESE TECHNICAL LITERATURE ACT

AND PRESIDENTIAL EXECUTIVE ORDER NO. 12591

BEFORE THE COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

SUBCOMMITTEE ON INTERNATIONAL SCIENTIFIC COOPERATION

HOUSE OF REPRESENTATIVES

WASHINGTON D.C.

WEDNESDAY, APRIL 27, 1988

The Department of State, in cooperation with the Department of Commerce and the National Science Foundation, has developed a pilot project designed to locate new sources of information on foreign scientific and technological developments, improve the quality of reporting, determine demand, and test various mechanisms for disseminating the information gathered. The project responds to Executive Order 12591 of April 10, 1987.

There is a vast wealth of unclassified information on foreign science and technology available within the agencies of the U.S. Government. This material includes trip reports from Government personnel, interviews of foreign scientists and government policymakers by U.S. Embassy officers, and highly technical reports filed by U.S. Government laboratory scientists and technicians. However, most of this material remains within the agency of origin. Distribution of relevant information even within an individual agency, particularly that received from our Embassies in cable format, has not been effective. Frequently, information of potential interest to a variety of offices is distributed to only one or two offices within the agency and, as a result, is not available to numerous potential end-users.

The Department of State is working to improve its own information distribution system as well as working to enhance distribution to other agencies. For example, all S&T reports

from U.S. Embassies are now routinely and automatically copied to the Office of Naval Research. In addition, foreign scientific and technological reporting from our Embassies is distributed from the Department to several Boards of the National Research Council; the National Academy of Engineering; the Office of S&T Information of the Department of Energy; the Office of Advanced Materials Coordination of the Bureau of Mines; the International Programs Office of the National Science Foundation; and the National Technical Information Service and the Office of Japanese Technical Literature of the Department of Commerce.

This six-month pilot project has been given the acronym STRIDE (S&T Reporting and Information Dissemination Enhancement). Under this program, State Department S&T officers in Tokyo, Bonn, Paris, London and other capitals are providing status reports on advanced structural ceramics, superconductivity and advanced microelectronics in their respective countries. A number of temporary assignments of Washington-based experts have been arranged to supplement Embassy reporting. For example, a materials scientist from Los Alamos National Laboratory returned recently from two months in our Embassy in Tokyo; a leading expert on biotechnology from the Food and Drug Administration will go to Tokyo for three months this fall. STRIDE reports are given to evaluators in

government, industry and academia. Comments on the reporting have been quite favorable. The reports are distributed in both printed copy and by electronic mail. This electronic format is viewed as essential to the successful operation of the project as it provides a rapid means of disseminating information to a large number of end-users.

A series of cables reporting on biotechnology in the People's Republic of China exemplifies the potential for reporting on foreign S&T developments. The five-part series prepared by the S&T Office in Embassy Beijing has been distributed to a variety of interested organizations in government, industry and academia. As a result, the American Society for Microbiology (ASM) has requested permission to publish two or three articles based on these reports for distribution to their 35,000 domestic and international members through their monthly newsletter, ASM NEWS. ASM will provide reprints of the articles it publishes for use by the Department of State.

The National Technical Information Service (NTIS) of the Department of Commerce is also involved in formulating ideas for expanding the commercial distribution of foreign scientific and technological information. NTIS will make available the entire text of the five-part biotechnology series.

In addition to the Department's own activities, SRI International is under contract to evaluate the materials received through the STRIDE project. Upon conclusion of the six-month pilot program in June, SRI International will provide its final report based on the evaluations received from selected individuals in government, industry and academia. Full implementation of the project will be based, in part, on this report and on the conclusions of the Departments of State and Commerce and the National Science Foundation.

STATEMENT OF

MR. CHARLES T. OWENS

HEAD, INFORMATION AND ANALYSIS SECTION

DIVISION OF INTERNATIONAL PROGRAMS

NATIONAL SCIENCE FOUNDATION

HEARINGS ON THE IMPLEMENTATION OF

THE JAPANESE TECHNICAL LITERATURE ACT

AND PRESIDENTIAL EXECUTIVE ORDER NO. 12591

BEFORE THE COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

SUBCOMMITTEE ON INTERNATIONAL SCIENTIFIC COOPERATION

HOUSE OF REPRESENTATIVES

WASHINGTON, D.C.

WEDNESDAY, APRIL 27, 1988

Mr. Chairman, I am pleased to have the opportunity to outline for you what I believe to be important means open to the United States to improve the availability of Japanese technical information. I believe these will make it possible for our Nation to more readily and more fully participate in the progress that Japan is sure to make in its future capacity for scientific and technological research. I will also describe the major efforts that the National Science Foundation is making to develop these approaches and capitalize on future opportunities.

BACKGROUND

During the last 27 years, NSF has actively supported cooperative research with Japan, involving the exchange visits of roughly 11,350 scientists and engineers between our two countries. This period of sustained cooperation has, in effect, laid the groundwork for the National Science Foundation's new "Japan Initiative," which is described below.

In the next 10 to 15 years in Japan, we should be seeing the results of a conscious Japanese effort to improve their performance in basic research and the production of new knowledge. Their government is devoting more of its resources to research, especially at the more fundamental end of the spectrum, and to developing first-class research facilities. The private

sector has likewise increased its R&D investment prodigiously: from 1975 to 1985, the average annual rate of increase was 10.4 percent; more dramatically, from 1980 to 1985 alone, it was 12 percent. At the same time, the proportion of private R&D reported as basic research has grown from about 5 percent to about 6 percent.

At the same time, beginning in the early 1980s, Japanese science-policy planners began to see that "internationalization" of their R&D system could be an important element in accomplishing their basic research goals. Japanese society has often used pressures or practices from outside Japan as a catalyst to change within. In the case of science and technology, there are two important incentives for "internationalization." One is the opinion of other countries about Japan's capacity and obligation to contribute to the advancement of civilization through investment in creating new knowledge available for use by all. The second is the stimulus to creativity which may accrue to the Japanese system through greater exposure to scientists and engineers from societies whose research systems have long been successful at creating new knowledge.

We don't know whether these policies will succeed and result in the kind of transformation of Japanese research which is their objective. What we do know is that Japan was very effective in building an impressive technical capacity using knowledge which

originated in all parts of the world, as well as in Japan. Japan's capabilities in applied science and engineering, in processing technologies, and in manufacturing are well-known to us all. I believe that the Japanese will devote the resources necessary to accomplishing their goals in basic research. Anyone who doubts the Japanese capacity to be creative has not fully appreciated what has been necessary in building the technological strength which Japan enjoys today. So the question for us becomes: how do we act to benefit from these circumstances?

MORE AMERICAN RESEARCHERS IN JAPANESE LABORATORIES

First and foremost, we should take advantage of the openings to the Japanese research system which are part of their desire to "internationalize" it. We need to make it possible for more of our scientists and engineers to have significant research experience in Japan. By this, I mean spending more than the typical week or two at a time in Japan. Our young people, especially, should seriously examine the opportunities for advancing their research careers which may come from this kind of on-site, first-hand Japanese experience.

There is a need for us to look more closely at the opportunities to learn from the Japanese. If we accept the notion that there is some excellent work underway now--and that there will likely be a great deal more as time goes on--we should position

ourselves to benefit from it. We should have many more researchers than we now do who have significant experience in how a Japanese laboratory functions, in how things get done, and in currents of thought which will influence future research efforts. Our people need to be at ease in Japanese laboratories and with Japanese colleagues, from whom they need to expect contributions to their joint understanding of how natural phenomena operate and how to attack research problems.

For decades, the Japanese have sent young researchers to work in our laboratories. We have benefitted from their hands and minds, but have largely ignored the potential benefits of reciprocal research stays by our young people in Japan. Partly, this oversight comes from assumptions (right or wrong) about the opportunities in Japan, a kind of self-satisfaction that we are probably the best. But part of it also comes from the fact that there may be a sacrifice involved. It is harder for an American to function in Japan than in the United States. There are cultural and language differences which are truly daunting. There are considerations of family, finances, and career opportunities. I believe, however, that we are beginning to think that an in-depth research visit to Japan may be worth it for the benefits which may be expected. If that is so today, it will be increasingly so as Japanese capabilities continue to grow.

NSF EFFORTS IN IMPROVING ACCESS TO JAPAN'S S&T RESEARCH

At the National Science Foundation, we are working hard to find opportunities in Japanese laboratories for our researchers and to make it possible for them to take up those opportunities. I would like to review for you where we are today in this effort.

Research Visits to Japan

Our "Japan Initiative," launched this fiscal year, will be able to support visits to Japan by 10 to 15 Americans, for stays of from six months to a year. In cooperation with the Japan Society for the Promotion of Science, we will be able to name an additional 25 Americans to receive fellowships funded by the Japanese Ministry of Education, Science, and Culture. These fellowships may be used at universities and at other laboratories supported by the Ministry of Education.

Funds made available by the Government of Japan, totalling about $4.8 million, will be used to send other American researchers selected by NSF to Japanese laboratories in the public sector, including national and academic laboratories, and in the private sector. We have an agreement with the Japanese institute responsible for research on the so-called "Fifth-Generation Computer Project," which gives access for NSF nominees to three researcher positions at the institute.

With the Ministry of International Trade and Industry (MITI), we have negotiated a Memorandum of Understanding which would give us access to 30 research positions in laboratories managed by MITI's Agency for Industrial Science and Technology. This MOU is pending interagency clearance. In addition, representatives of the Science and Technology Agency have announced the availability, beginning this fall, of as many as 35 fellowships to Japanese laboratories in the public sector. Some proportion of these 35--as yet undetermined--will be admitted based on nomination by NSF. We have also identified 123 Japanese companies who have indicated their willingness to receive American researchers. Moreover, we are currently using our NSF/Tokyo office to assist American researchers in Japan, and will soon assign to Japan a person whose responsibilities will include both searching out additional researcher openings for Americans, and assisting with the orientation and support of what we hope will be a rapidly growing contingent of Americans in Japan for long-term research stays.

Language Training

Mr. Chairman, a close concomitant of sending more researchers to Japan has to be teaching more of our researchers to speak and read Japanese. There is an obvious connection between facility with the language and the ability to benefit from a stay in a

laboratory abroad. Being able to read foreign languages can also provide access to literature not available in English.

When I was studying international relations at Berkeley, I worked as a scanner/measurer in Luis Alvarez's group at the Lawrence Radiation Laboratory. Most of my peers were graduate students in physics at Berkeley, and all of them had to know at least one foreign language to get their Ph.D.

This is no longer the case. The wide availability in English of foreign-produced research results has made such requirements--once necessary to keep up with the literature--seem superfluous. I would argue that there has been a further, unexpected, result: our researchers don't think as seriously about doing work overseas as a valuable part of their career as they did in the past. The numbers of our researchers going abroad have fallen off, and those who do go overwhelmingly choose Great Britain and Canada as their destinations.

I realize that the United States' dominant position in science and engineering research has contributed to this trend. However, I believe that those who have language facility, especially in speaking, will feel more at ease with a decision to spend a year or so in another country. Such facility is very important in a country like Japan, where the quality of daily life--and laboratory life--is improved enormously by even a modest capacity

87-536 - 89 - 4

to communicate. The same level of proficiency which, if delivered in French to a Parisian, may elicit sneers will, if delivered in Japanese to a Tokyoite, elicit joyous endeavors to assist and compliments to the speaker. We think that people who are comfortable with the language will be more likely to go to Japan and will have a better research stay there.

The National Science Foundation has just initiated Japanese-language fellowships directed primarily at graduate students and postdoctoral scientists and engineers who want to prepare for a research stay in Japan. These fellowships provide a good incentive to undertake or continue the study of Japanese, and allow for both academic-year training and for intensive summer study. More-senior researchers wishing to acquire Japanese for a sabbatical research stay in Japan may also be supported.

We are also making available support for the development of materials and curricula for technical Japanese instruction. We recently made a grant to MIT's Japan Program to run a pilot study for an intensive summer course in technical Japanese over the next three years. In addition, we have just made a renewal grant to the American Electronics Association to continue language-training support for graduate engineering and computer science fellows, selected by the AEA, who are going to spend research visits in Japanese industrial laboratories. Within the limited funds available for this purpose, we will make additional similar

awards in what we hope will be a "pump-priming" effort to develop a resource that will eventually be self-sustaining. In addition, we have been working with the Japanese Ministry of Education to develop a summer course at Tsukuba University which might be taken by our researchers just before they begin their research program in Japan.

We believe that acquisition of Japanese-language facility by our scientific community will be key to increasing the numbers of people interested in doing research in Japan. It will also be key to enhancing our ability to benefit from Japanese scientific advances now and into the future.

Follow-Up Activities

We need to consider how we can obtain the broadest possible benefits from visits to Japan through appropriate post-visit activities. Our firms need to consider whether there might not be some special short- or long-term benefit in hiring a young researcher who has some significant knowledge about science and technology in Japan. Young people who go to Japan for a year need to feel that they have not given up their place in the employment queue, and that there will be a place for them to come back to.

We also need to ask those whom we support in visits to Japan to share with others what they have learned--about coping with life in Japan as well as about science or technology. At the National Science Foundation, we are asking all of our grantees who conduct research visits in foreign countries to fill out a brief questionnaire on their experiences. We will make the results, in aggregated format, available to others who might be thinking about a stay abroad at a particular institution.

Some more formal utilization of returnees' expertise would also probably be appropriate. We are currently thinking about a program of some sort of post-visit presentation or presentations for others in the same field and/or who may be considering a research stay in Japan. We should probably make use of returnees as advisors concerning the conduct of our support programs, perhaps sponsoring an annual reunion or other activities to encourage continuing communication, both among returnees and with us.

Disciplinary Survey Visits

By far the most effective attractant for American researchers who might go to Japan is the knowledge that doing so will provide an excellent research opportunity. We need to assist in the process of making both opportunities and the existence of excellent Japanese facilities in Japan known to our researchers. To do

this, the National Science Foundation can sponsor state-of-the-art surveys in particular disciplines--as recommended by researchers in those disciplines. U.S. experts can be sent to Japan for visits to laboratories throughout the country in the discipline concerned. Upon their return, a report for other workers in the discipline will be prepared. Ideally, dissemination would be through an appropriate disciplinary journal, though NSF can, if necessary, print and distribute the reports. These survey teams would complement the technical-capability surveys done under JTECH, also partially supported by the Foundation. To date, one such survey visit has been organized--in aseismic base isolation research. We are hoping to hear from others in the research community who feel that such survey visits would be beneficial to workers in their respective fields.

We are also working with the Department of Commerce's Office of Japanese Technical Literature to distribute our survey visit reports through the National Technical Information Service.

Use of Foreign S&T Information

On the broader question of utilizing information about foreign science and technology, I have just a few comments. As the National Science Foundation's Deputy Director, Dr. John Moore, has previously testified, the Foundation--with the Department of

State and the Department of Commerce--is sponsoring a pilot study on the dissemination of unclassified U.S. government reports primarily to the non-government research community. Reports from State Department science officers and from NSF offices overseas are being evaluated by readers in research and development companies large and small, in universities, in national laboratories, and in firms whose business is the provision of technical information. The study, which is being carried out by SRI International, will conclude in early summer. At that time, we hope to have a better idea of who is interested in what kind of information, in what format, and at what potential cost. This study is one response by the agencies affected by Presidential Executive Order No. 12591 of April 10, 1987.

The small unit which I head at NSF is collecting information from many open sources for inclusion in an on-line service available within NSF. It is our hope to make much of this information more broadly available to users outside NSF as well. We will be guided in this effort by the results of the pilot study. In addition to the kind of selection and editing function which is now our main effort, we will be adding our own comments and interpretations to these reports originated by others. We will also be producing analyses of trends and other independent analytical reports.

CONCLUSION

These are a few of the areas which I believe merit serious attention in increasing the availability in the United States of information on Japanese science and technology. I have also included descriptions of some of the things which the National Science Foundation is doing in these same areas.

I will be happy to answer any questions which members of the Subcommittee may have on these or related matters.

TESTIMONY OF BARRY C. BERINGER
ASSOCIATE UNDER SECRETARY FOR ECONOMIC AFFAIRS

BEFORE THE
HOUSE SUBCOMMITTEE ON INTERNATIONAL
SCIENTIFIC COOPERATION

APRIL 27, 1988

Mr. Chairman, I am pleased to have the opportunity to present testimony on the role of Japanese technical information in improving U.S. competitiveness, and more specifically on the Department of Commerce efforts to implement P.L. 99-382, the Japanese Technical Literature Act of 1986.

In June of last year Under Secretary for Economic Affairs Robert Ortner established an Office of Japanese Technical Literature staffed by two Japanese-speaking professionals. This office is responsible for coordinating all activities carried out under the Act and serves as the central point of contact within the Department and with other Federal agencies and departments on activities related to the acquisition and dissemination of Japanese technical literature.

Our approach in implementing the Act has been to increase awareness of existing resources for Japanese technical information within and outside the government, to coordinate Federal Government efforts in order to avoid duplication, and to provide appropriate information where gaps exist.

A report to Congress on all Federal efforts to acquire, translate, abstract, and disseminate Japanese technical literature prepared by my staff confirms the existence of significant activity concentrated in the Departments of Commerce, Defense, Energy, State, the National Science Foundation, and the National Aeronautics and Space Administration. The Central Intelligence Agency's Foreign Broadcast Information Service is also a major contributor. All of these agencies are involved in the acquisition of Japanese archival information in the form of journal and newspaper articles, patent abstracts and technical reports. Some generate more current information such as trip reports obtained through research visits or on-site personnel located in Japan. All of this material needs to be more widely disseminated within the Federal establishment and to industry.

As one means of meeting this objective, with the cooperation of the Commerce Department's National Technical Information Service we publish an annual directory of programs and services in the United States which abstract, translate, and disseminate Japanese technical literature. Titled the "Directory of Japanese Technical Resources," this volume also contains a listing of nearly 200 Federally-sponsored Japanese translations and case studies of successful U.S. company efforts to acquire, translate, and utilize Japanese technical

utilize Japanese technical information. The first directory was published in December 1987 and can be purchased from the National Technical Information Service. We are currently compiling the 1988 directory for publication in the Fall. It will contain additional sections on Japanese technology transfer material available in English and university training programs for American scientists and engineers planning to do research in Japan.

As an additional means of increasing awareness of Federal resources and fostering increased cooperation, we recently cosponsored an experimental workshop for government employees on "High Tech Materials - State of the Art in Japan," with the Office of Naval Research and the Department of Energy. This workshop featured briefings on important high technology developments by U.S. scientists affiliated with the Office of Naval Research (ONR) facility in Tokyo. Based on the success of this workshop in imparting information on Japanese materials research in a personal and timely way, we plan to sponsor a similar series of workshops for industry. Under the proposed plan, papers presented at these workshops will be published and made available through the National Technical Information Service with appropriate professional societies and industry groups apprised of their availability. Along a similar vein we are now working with the National Science Foundation to publish

and disseminate trip reports generated by grant recipients and reports from NSF Tokyo office staff through the National Technical Information Service. We will be extending such an effort to other agencies which sponsor personnel on research visits to Japan.

These and other means to enhance dissemination and coordination will be fully addressed by working groups established as a result of an inter-agency meeting on Japanese technical literature held on March 30, 1988. A group on copyright has been formed to determine legal means of overcoming this barrier to wider dissemination of Japanese translations. Copyright issues may also be addressed in the forum provided by a task force on scientific and technical information established through renewal of the bilateral umbrella science and technology agreement. The agreement has been initialled by both sides with formal ratification expected soon. An additional working group will develop a plan to establish an office arrangement in Japan which builds an existing U.S. government and industry facilities in Tokyo. The Office of Japanese Technical Literature will be holding additional inter-agency meetings on a regular basis to monitor progress of the working groups and deal with new issues as they arise.

In addition to these efforts to encourage wider dissemination of existing resources, the Office of Japanese Technical Literature engages in the primary acquisition of information through monitoring and analysis of Japanese publications and personal contacts with Japanese government and industry officials. Office staff review material obtained from an NTIS acquisitions agent in Japan and provide suggestions for additional documents for which a need has been determined.

The Office is initiating a periodic publication summarizing Japanese high technology trends and highlighting monthly NTIS Japan acquisitions. It will also contain information on ongoing activities of the Office of Japanese Technical Literature and related government efforts.

To alert industry to key high technology developments in Japan, the Office sponsors annual reports on specific technologies. In fiscal year 1987 we sponsored a report summarizing the status of Japanese R&D in advanced ceramics which is available through the National Technical Information Service. A similar report on flexible manufacturing systems (FMS) has been drafted for publication within a month. For fiscal year 1988 the Office will sponsor reports on biotechnology, supercomputers, and heating , venting, and airconditioning technology Plans are also underway to conduct an assessment of extant and

emerging technical database resources in Japan with an analysis of the present and future utility of these databases to the American consumer.

While these efforts are geared toward enhancing the supply of Japanese technical information, we have also attempted to systematically assess demand in order to better focus our activities to meet user needs. For this reason we sponsored a survey of U.S. government and industry demand for Japanese technical literature in the specific field of advanced ceramics. We chose advanced ceramics because it is a field in which considerable research and development efforts are taking place across a wide spectrum of U.S. laboratories in government and industry and it is also an area in which we are competitive with the Japanese. The survey was conducted for the Department by Justin Bloom - a former science counsellor at the U.S. Embassy in Tokyo.

The survey attempted to determine what a range of U.S. laboratories (small, medium, and large sized companies, government, and not for profit research institutes) are doing to track Japanese science and technology developments and for those institutions which have programs in place, what factors are viewed as important in structuring these efforts. The final survey report, impossible to summarize here, confirmed

that literature acquisition is most effective when carried out in conjunction with personal contacts, research visits, and other means of obtaining the most up-to-date information. The final report will be published by the National Technical Information Service. With this as a basis we are conducting modified surveys of professional societies to identify the most important technical journals and laboratory reports in specific technical fields.

The 1989 Budget proposes to expand activities in this area by more than doubling the size of the new office of Japanese Technical Literature. Funding is to be transferred from other Commerce agencies. Ongoing Japanese Technical Literature programs in these agencies will continue at current levels.

As I mentioned earlier, the "Directory of Japanese Technical Resources" and report to Congress indicate a vast array of sources for information on Japanese science and technology in the government and private sectors. Our work to date indicates that information <u>providers</u> in the public and private sectors have stepped up their efforts in the last decade to obtain information from Japan. The demand from information <u>users</u> requires more cultivation, and we are confident that over time our efforts to refine and enhance supply will bring about results.

There is however, no "magic wand" that we can wave over this issue, because there is no guarantee that even if we could identify a single ideal source and ideal means of dissemination of Japanese information that we would have many users. The United States has only recently begun to look to foreign information on non-military technology as an important element of our competitiveness strategy. The Japanese have been doing it for better than a century.

In sum, our endeavors to faithfully carry out the Act's objectives, will take time to bear fruit, and, must be carried out in tandem with users. I will be happy to answer any questions you may have.

APPENDIX II

ADDITIONAL QUESTIONS AND ANSWERS FOR THE RECORD

ROBERT A. ROE, New Jersey, Chairman

GEORGE E. BROWN, JR., California
JAMES H. SCHEUER, New York
CHARLES WILSON, Texas
DOUG WALGREN, Pennsylvania
DAN GLICKMAN, Kansas
HAROLD L. VOLKMER, Missouri
BILL NELSON, Florida
RALPH M. HALL, Texas
DAVID MCCURDY, Oklahoma
NORMAN Y. MINETA, California
BUDDY MACKAY, Florida
TIM VALENTINE, North Carolina
ROBERT G. TORRICELLI, New Jersey
RICK BOUCHER, Virginia
TERRY BRUCE, Illinois
RICHARD H. STALLINGS, Idaho
JAMES A. TRAFICANT, JR., Ohio
JIM CHAPMAN, Texas
LEE H. HAMILTON, Indiana
HENRY J. NOWAK, New York
LEON C. PANETTA, Kentucky
TOM MANATOS, Maryland
DAVID E. PRICE, North Carolina
DAVID R. NAGLE, Iowa
JIMMY HAYES, Louisiana
DAVID D. SKAGGS, Colorado

MANUEL LUJAN, JR., New Mexico
ROBERT S. WALKER, Pennsylvania
F. JAMES SENSENBRENNER, JR., Wisconsin
CLAUDINE SCHNEIDER, Rhode Island
SHERWOOD L. BOEHLERT, New York
TOM LEWIS, Florida
DON RITTER, Pennsylvania
SID MORRISON, Washington
RON PACKARD, California
ROBERT C. SMITH, New Hampshire
PAUL B. HENRY, Michigan
HARRIS W. FAWELL, Illinois
D. FRENCH SLAUGHTER, JR., Virginia
LAMAR SMITH, Texas
ERNEST L. KONNYU, California
JACK BUECHNER, Missouri
JOEL HEFLEY, Colorado
CONSTANCE A. MORELLA, Maryland

HAROLD P. HANSON
Executive Director
ROBERT C. KETCHAM
General Counsel
R. THOMAS WEIMER
Republican Staff Director

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
SUITE 2321 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
(202) 226-8371

May 16, 1988

Dr. Christopher Hill, Senior Specialist
Science and Technology Policy
Congressional Research Service
Library of Congress
Washington, DC 20540

Dear Dr. Hill:

On behalf of the Subcommittee on International Scientific Cooperation, I would like to thank you for your recent insightful testimony on Sharing Foreign Technology. Your testimony will be very useful to the Subcommittee as it weighs legislative options in this critical area of scientific cooperation.

Due to time constraints, we were unable to ask some questions we believe are important to fully understand this issue. We have enclosed these questions and request that you respond to them within two weeks. We have also included a copy of your transcribed testimony in order that you may correct, for the printed record, any transcriptional or typographical errors.

Once again, we would like to thank you for your excellent testimony on Sharing Foreign Technology. If you have any questions, please contact Virginia Gold of the Subcommittee staff at (202) 226-3636.

Sincerely,

Ralph M. Hall

RALPH M. HALL, Chairman
Subcommittee on International
Scientific Cooperation

RMH/Gls
Enclosures

SUBCOMMITTEE ON INTERNATIONAL SCIENTIFIC COOPERATION

Hearing on "Sharing Foreign Technology:
Should We Pick Their Brains?"

April 27, 1988

ADDITIONAL QUESTIONS FOR DR. CHRISTOPHER HILL

1. You indicate that because of the uncertainty of industrial demand for foreign scientific and technical information, Congress may wish to continue monitoring and reassessing its commitment to improving access to this information, rather than pursue a more active approach.

   a. What do you think is the reason for this uncertainty in demand?

   b. What steps would you recommend to stimulate demand for foreign scientific and technical information?

2. It has been asserted that the preoccupation of U.S. business with short term results, and their inability to plan for the long term is responsible in part for its lack of interest in pursuing foreign scientific and technical information.

   a. Would you agree with this assertion?

   b. And how would you propose to help business overcome this short term bias?

3. Dr. Rustum Roy has stated that the rationale for public funding for scientific research in this country over the past 40 years has been mistaken. He says that the premise was that good science leads to good technology, and that if we cultivate basic science, then technology and prosperity will follow.

   a. Do you agree that this premise is incorrect?

   b. Is the opposite true — namely, that technology leads to science?

Congressional Research Service
The Library of Congress

Washington, D.C. 20540

May 27, 1988

MEMORANDUM

TO: Hon. Ralph M. Hall, Chairman
Subcommittee on International Scientific Cooperation
Committee on Science, Space, and Technology

FROM: Christopher T. Hill, Senior Specialist
Science and Technology Policy

RE: Responses to Questions Arising from Testimony

This is in response to your letter of May 16, which asks certain questions arising from my testimony before your subcommittee on April 27, 1988. This memorandum restates each question and responds to each in turn.

1. You indicate that because of the uncertainty of industrial demand for foreign scientific and technical information, Congress may wish to continue monitoring and reassessing its commitment to improving access to this information, rather than pursue a more active approach.

   a. What do you think is the reason for this uncertainty in demand?

My written testimony says that Congress "... may wish to continue to monitor and reassess its commitment to improving access to Japanese technical information." The suggestion is that continual oversight would be prudent in view of the uncertainties in demand. Such oversight would be compatible with either taking additional action or not taking additional action, and it recognizes that uncertainty remains with either path.

The assertion that industrial demand is currently uncertain is based on the implicit assumption that the current evidence of low sales and low interest may not be an adequate reflection of the "real" demand for such information. This assumption, although thought by many to be quite plausible, is not necessarily accurate. The "uncertainty of industrial demand" means that we just don't understand why firms are not willing to pay enough for some of the existing sources of foreign technical information to constitute adequate demand for them. Some of the possible explanations are:

   i. Because of the language and cultural barriers between U.S. firms and Japanese firms, the technical and managerial staff of U.S. firms may simply not be able to judge whether foreign technical information would be useful to them.

ii. The kinds of products that have recently been offered for sale in the U.S. (e.g., translated abstracts, full-text translations, computerized bibliographic data bases of Japanese articles and translations) may not be useful in the context of how American engineers actually get access to technical information in general, regardless of source (e.g., personal networks, browsing professional and trade journals, trade shows, conferences).

iii. Because the initial market for new information products is small, the unit prices that vendors must charge to cover their start-up costs are relatively high. It may be difficult for producers of new foreign technical information products to survive this early phase without some sort of subsidy, whether it comes from private or public sources of capital.

b. What steps would you recommend to stimulate demand for foreign scientific and technical information?

Demand for foreign scientific and technical information ("FSTI"), especially from Japan, might be stimulated by, among others, the following kinds of steps:

i. Assist in increasing the number of U.S. engineers, scientists, and managers (and students in these fields) who either visit Japan for extended periods of time or study the Japanese language, so that they would become aware of the opportunities for technological advance that such information might provide.

ii. Provide tax or other incentives to potential users of FSTI to help pay for their own efforts at accessing it.

iii. Require that all proposals to Federal agencies for grants or contracts in support of research, development, or procurement of "high-technology" goods and services be accompanied by written evidence that the proposer is aware of and familiar with the state of the art of related work overseas.

2. It has been asserted that the preoccupation of U.S. business with short term results, and their inability to plan for the long term is responsible in part for its lack of interest in pursuing foreign scientific and techical information.

a. Would you agree with this assertion?

It is indeed widely believed that U.S. business is driven by a variety of forces to focus on short-, rather than long-term results. However, it is difficult to see how this bias would lead firms to pay inadequate attention to FSTI. To the contrary, it can be argued that a firm focusing on the short term would be more likely to look to its external environment for new information and new business opportunities, whereas one concerned with the long term might well pay less attention to immediately usuable technologies from outside,

including other countries, and focus more of its efforts on developing its own new technologies in house. One may also need to differentiate between scientific and technical information in addressing this issue. Clearly, a focus on the long term should, in general, cause firms to be more interested in basic scientific information, regardless of source -- foreign or domestic; whereas a focus on the short term might lead to a greater focus on technial information, but again independent of source. On balance, short- vs long-term concerns may have little to do with the lack of interest in FSTI.

b. And, how would you propose to help business overcome this short term bias?

The issue of short term bias is a complex one, and, as suggested above, may not be central to the demand for FSTI. However, some of the suggestions that have been made for overcoming the alleged short-term bias of U.S. business include: restructuring the capital gains tax so as to charge high rates on returns from short-term investments and low rates on returns from long-term investments, changing compensation packages for executives so that pay depends not just on recent firm performance but on some aggregate of performance over the past several years, and lowering the cost of investment capital for firms in general -- perhaps by intervening in capital markets so as to discourage investment in alternatives such as housing and commercial real estate. (This issue was not addressed in the CRS report that was the basis for my testimony. It could be addressed in future CRS work as a new project.)

3. Dr. Rustum Roy has stated that the rationale for public funding for scientific research in this country over the past 40 years has been mistaken. He says that the premise was that good science leads to good technology, and that if we cultivate basic science, then technology and prosperity will follow.

a. Do you agree that this premise is incorrect?

I agree that Dr. Roy has characterized fairly a significant part of the rationale for public funding of scientific research over the past 40 years. I would also say that the premise has often been stretched too far. The difficulty is that, whereas the premise is sometimes correct, as in the case, for example, of the atomic bomb or the exploitation of gene splicing techniques, it is also often inadequate to describe the actual pathways by which new and improved technologies emerge. Scientific research and technology development are two separate but highly interactive activities.

b. Is the opposite true -- namely, that technology leads to science?

Much of our modern scientific research is motivated by the need to understand better what technologists are already able to do in industry or elsewhere. For example, practical craftsmen were able to refine iron and later make steel decades, if not centuries, before modern physics, chemistry, and metallurgy developed the fundamental understanding of why the various processes worked as they did. On the other hand, the fundamental studies that have been done during the last century, and that continue, have made it possible to exert

much better control over all of the variables that affect the properties, performance, and costs of modern metallic alloys. In examples like these, which are legion, technological developments, whatever their source, have both stimulated and benefitted by scientific research. Often, even the "practical" inventors of new technologies are informed by the long-ago scientific studies of long-dead scientists, even if they are unaware of the connections. In addition, new technologies are often central to the advance of science, as illustrated by the widespread use of the laser in basic research.

I hope these comments will be useful to the Committee.

ROBERT A. ROE, New Jersey, CHAIRMAN

GEORGE E. BROWN, JR., California
JAMES H. SCHEUER, New York
MARILYN LLOYD, Tennessee
DOUG WALGREN, Pennsylvania
DAN GLICKMAN, Kansas
HAROLD L. VOLKMER, Missouri
BILL NELSON, Florida
RALPH M. HALL, Texas
DAVE MCCURDY, Oklahoma
NORMAN Y. MINETA, California
BUDDY MACKAY, Florida
TIM VALENTINE, North Carolina
ROBERT G. TORRICELLI, New Jersey
RICK BOUCHER, Virginia
TERRY BRUCE, Illinois
RICHARD H. STALLINGS, Idaho
JAMES A. TRAFICANT, JR., Ohio
JIM CHAPMAN, Texas
LEE H. HAMILTON, Indiana
HENRY J. NOWAK, New York
CARL C. PERKINS, Kentucky
TOM MCMILLEN, Maryland
DAVID E. PRICE, North Carolina
DAVID R. NAGLE, Iowa
JERRY HAYES, Louisiana
DAVID E. SKAGGS, Colorado

MANUEL LUJAN, JR., New Mexico
ROBERT S. WALKER, Pennsylvania
F. JAMES SENSENBRENNER, JR., Wisconsin
CLAUDINE SCHNEIDER, Rhode Island
SHERWOOD L. BOEHLERT, New York
TOM LEWIS, Florida
DON SITTER, Pennsylvania
BOB MORRISON, Washington
ROB PACKARD, California
ROBERT C. SMITH, New Hampshire
PAUL B. HENRY, Michigan
HARRIS W. FAWELL, Illinois
D. FRENCH SLAUGHTER, JR., Virginia
LAMAR SMITH, Texas
ERNEST L. KONNYU, California
JACK BUECHNER, Missouri
JOEL HEFLEY, Colorado
CONSTANCE A. MORELLA, Maryland

HAROLD P. HANSON
Executive Director
ROBERT C. KETCHAM
General Counsel
G. THOMAS WEIMER
Republican Staff Director

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
SUITE 2321 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
(202) 225-6371

May 16, 1988

Professor Rustum Roy
102 Materials Research Laboratory
The Pennsylvania State University
University Park, PA 16802

Dear Professor Roy:

On behalf of the Subcommittee on International Scientific Cooperation, I would like to thank you for your recent insightful testimony on Sharing Foreign Technology. Your testimony will be very useful to the Subcommittee as it weighs legislative options in this critical area of scientific cooperation.

Due to time constraints, we were unable to ask some questions we believe are important to fully understand this issue. We have enclosed these questions and request that you respond to them within two weeks. We have also included a copy of your transcribed testimony in order that you may correct, for the printed record, any transcriptional or typographical errors.

Once again, we would like to thank you for your excellent testimony on Sharing Foreign Technology. If you have any questions, please contact Virginia Gold of the Subcommittee staff at (202) 226-3636.

Sincerely,

Ralph M. Hall

RALPH M. HALL, Chairman
Subcommittee on International
Scientific Cooperation

RMH/Gls
Enclosures

SUBCOMMITTEE ON INTERNATIONAL SCIENTIFIC COOPERATION

Hearing on "Sharing Foreign Technology:
Should We Pick Their Brains?"

April 27, 1988

ADDITIONAL QUESTIONS FOR DR. RUSTUM ROY

1. You state that the most important vehicle for gathering foreign technical information is establishing personal relations with the worldwide leaders in the field in which you are interested.

   a. How would you recommend that these relationships be established? Do you advocate meetings and seminars sponsored by trade groups? Are there any other ways to form personal relationships among scientists and engineers?

   b. Is there a federal role to play in facilitating these relationships?

2. You advocate laboratory visits and personal relations as important opportunities for accessing foreign technical information.

   a. Do foreign industrial labs inhibit U.S. access to relevant scientific and technical information?

   b. Are they really as open as they claim to be?

3. You indicate that countries like Japan and West Germany invest much more heavily in civilian R&D than the U.S., and that in the aggregate, more applied science and technology is now done outside the U.S. than inside.

   a. Is this a generally held assumption?

   b. What would you say is the percentage breakdown of applied science and technology developments between the U.S. and other countries? In other words, how much is developed here and how much emanates from beyond our borders?

   c. In what fields are U.S. programs being overshadowed?

PENNSTATE

Materials Research Laboratory

Telephone: (814) 865-3421
Fax No. (814) 865-2326

The Pennsylvania State University
University Park, PA 16802

May 24, 1988

Ralph M. Hall, Chairman
Subcommittee on International
Scientific Cooperation
U.S. House of Representatives
Suite 2321 Rayburn House Office Bldg.
Washington, DC 20515

Dear Congressman Hall,

I enclose the corrected transcript and answers to your questions.

Sincerely yours,

Rustum Roy

Dictated by Professor Roy
but signed in his absence.

Rustum Roy
Evan Pugh Professor of the Solid State

RR/wb

An Equal Opportunity University

Responses from Professor Roy to April 27 Questions

1a. There are two or three structured way sto establish the relationships:

1. Joint seminars on selected topics followed by a series of visits to labs of the hosts. There has to be reciprocity on a year-by-year basis.

2. Visits by Japanese scientists as short-term (6-18 mos) staff in U.S. University groups and reciprocal visits by U.S. professsors (for days-weeks) and their students (for weeks-months) in Japanese industry.

3. Individual lectures by senior U.S. professors or industrial scientists at major Japanese industrial research laboratories. These visits always include a day or two spent going around the laboratories for very open discussion.

4. Yes. Sponsor reciprocal seminars/meetings just as NSF-OIP does. I took the very first team to Japan.
Provide enough money for extending travel to meetings by adding on industrial and research lab visits.

2a. Of course they limit some parts to all visitors, much of a lab to many; but a senior research worker gets to see an extraordinary amount.

I can only report that in 25 years of visits to Soviet, Japanese and Dutch labs I have seen more detail than I can in ANY American company, including some I have consulted for for 20 years.

b. They are more open than ours are. While they will often be evasive on new work they NEVER lie (especially the Soviets). No one talks about their current hottest work anymore, except to trusted friends. We certainly don't here--not even in universities.

3. No, but with more and more books starting with my Lost at the Frontier (1985) down to the NAE Study on Competitiveness (1988) the point is being repeated widely that Japan and Germany invest more in percent of GNP in civilian R&D than do we. In the aggregate Western Europe and Japan have now substantially surpassed the U.S. in civilian R&D.

a. No: this is not yet widely known in the Congress and not in academic circles.

b. I cannot dare to speak across fields but in materials science and engineering, especially in metallurgy and ceramics, the U.S. is between 30-40% of many fields (as shown by my figures in the testimony).

It is not important exactly where we stand, what is most significant are the relative trendlines. Theirs--driven largely by Japan + France + Germany--is strongly up. Ours is still down--except defense (and SDI) related programs.

c. Applied materials research--outside the semiconductor field--is dominated by Japan and Western Europe. The U.S. is losing ground in these core technologies from vapor-phase diamonds to new magnetic materials to new piezo motors.

ROBERT A. ROE, New Jersey, CHAIRMAN

GEORGE E. BROWN, JR., California
JAMES H. SCHEUER, New York
MARILYN LLOYD, Tennessee
DOUG WALGREN, Pennsylvania
DAN GLICKMAN, Kansas
HAROLD L. VOLKMER, Missouri
BILL NELSON, Florida
RALPH M. HALL, Texas
DAVE McCURDY, Oklahoma
NORMAN Y. MINETA, California
BUDDY MacKAY, Florida
TIM VALENTINE, North Carolina
ROBERT S. TORRICELLI, New Jersey
RICK BOUCHER, Virginia
TERRY BRUCE, Illinois
RICHARD H. STALLINGS, Idaho
JAMES A. TRAFICANT, JR., Ohio
JIM CHAPMAN, Texas
LEE H. HAMILTON, Indiana
HENRY J. NOWAK, New York
CARL C. PERKINS, Kentucky
TOM McMILLEN, Maryland
DAVID S. PRICE, North Carolina
DAVID R. NAGLE, Iowa
JIMMY HAYES, Louisiana
DAVID E. SKAGGS, Colorado

U.S. HOUSE OF REPRESENTATIVES

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

SUITE 2321 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
(202) 226-8371

MANUEL LUJAN, JR., New Mexico
ROBERT S. WALKER, Pennsylvania
F. JAMES SENSENBRENNER, JR., Wisconsin
CLAUDINE SCHNEIDER, Rhode Island
SHERWOOD L. BOEHLERT, New York
TOM LEWIS, Florida
DON RITTER, Pennsylvania
SID MORRISON, Washington
RON PACKARD, California
ROBERT C. SMITH, New Hampshire
PAUL B. HENRY, Michigan
HARRIS W. FAWELL, Illinois
G. FRENCH SLAUGHTER, JR., Virginia
LAMAR SMITH, Texas
ERNEST L. KONNYU, California
JACK BUECHNER, Missouri
JOEL HEFLEY, Colorado
CONSTANCE A. MORELLA, Maryland

HAROLD P. HANSON
Executive Director
ROBERT C. KETCHAM
General Counsel
S. THOMAS WEIMER
Republican Staff Director

May 16, 1988

Dr. Justin Bloom, President
Technology International, Inc.
11600 Georgetown Court
Potomac, MD 20854

Dear Dr. Bloom:

On behalf of the Subcommittee on International Scientific Cooperation, I would like to thank you for your recent insightful testimony on Sharing Foreign Technology. Your testimony will be very useful to the Subcommittee as it weighs legislative options in this critical area of scientific cooperation.

Due to time constraints, we were unable to ask some questions we believe are important to fully understand this issue. We have enclosed these questions and request that you respond to them within two weeks. We have also included a copy of your transcribed testimony in order that you may correct, for the printed record, any transcriptional or typographical errors.

Once again, we would like to thank you for your excellent testimony on Sharing Foreign Technology. If you have any questions, please contact Virginia Gold of the Subcommittee staff at (202) 226-3636.

Sincerely,

Ralph M. Hall

RALPH M. HALL, Chairman
Subcommittee on International
Scientific Cooperation

RMH/Gls
Enclosures

SUBCOMMITTEE ON INTERNATIONAL SCIENTIFIC COOPERATION

Hearing on "Sharing Foreign Technology:
Should We Pick Their Brains?"

April 27, 1988

ADDITIONAL QUESTIONS FOR DR. JUSTIN BLOOM

1. Your report states that the respondents in your survey of companies and labs involved in advanced ceramics research cited various non-technical factors as more important for improving U.S. competitiveness than having Japanese scientific and technical information programs. These non-technical factors included U.S. management and financial problems; failure of the U.S. educational system to produce technical and liguistic literates; and better cooperation among government, industry, universities, and the media.

   a. How do you rate these factors in terms of importance?

   b. Do these non-technical factors perhaps influence whether research programs will be receptive to Japanese technical information?

2. Your report on the demand for Japanese technical information concluded that the short term nature of U.S. R&D programs is at fault in inhibiting U.S. interest in foreign scientific and technical information. What efforts would you recommend to help business overcome this bias?

3. You indicate that the Commerce Department is currently evaluating the feasibility of establishing a Japanese translation consortium to pool translation performed in both the public and private sectors. Do you think this is a cost-effective approach and are you in favor of it?

TECHNOLOGY INTERNATIONAL, INC.
11600 GEORGETOWNE COURT
POTOMAC, MARYLAND 20854 (301) 983-8247

May 19, 1988

Ms. Virginia Gold
Subcommittee on International
Scientific Cooperation
Room 822, House Annex #1
Washington, D.C. 20515

Dear Virginia:

I am enclosing the transcript sent me for editing. The quality of the transcription was excellent, and my corrections are minor. I do wish to make one substantive change and request the Subcommittee's approval to do so.

At line 1185, page 52, please add the words "Dr. Roy's laboratory at" before "Penn State". In explanation, a questionnaire was sent to Penn State but it was completed by another scientist.

Also, please note that the correspondence from the Subcommittee and the testimony refer to me as "Dr." I do not have a PhD and I have tried to correct the record to show this.

Finally, I am also enclosing my responses to the additional questions raised in Chairman Hall's letter of May 16th. Please observe that one paragraph refers to the activities of FBIS. If this is too sensitive, it should be removed from my response.

Many thanks for your continued patience with me. I thought the hearing was most interesting and that a considerable amount of useful information was communicated to the Congress. A substantial share of the credit for this goes to you.

Sincerely,

Justin

Justin L. Bloom
President

Encl: 1. Transcript HSY 118110

2. Reply to Additional Questions from Subcommittee

Reply to Additional Questions from Subcommittee

Justin L. Bloom

1. Your report states that the respondents in your survey of companies and labs involved in advanced ceramics research cited various non-technical factors as more important for improving U.S. competitiveness than having Japanese scientific and technical information programs. These non-technical factors included U.S. management and financial problems; failure of the U.S. educational system to produce technical and linguistic literates; and better cooperation among government, industry, universities, and the media.

a. How do you rate these factors in terms of importance?

b. Do these non-technical factors perhaps influence whether research programs will be receptive to Japanese technical information?

It is difficult to give a ranking to the identified non-technical factors that adversely affect U.S. competitiveness, since each factor is related to the others in a complicated way. However, in my personal opinion, the overriding issue seems to be the drifting away from sound management practices in the private sector that encourage long-term R&D and innovation toward management preoccupation with short-term returns on investment. Of course, this trend is not found in every corporation, but it is generally acknowledged that there is too small a proportion of technically equipped corporate officers in American manufacturing companies, and that these corporations are controlled to a large extent by lawyers, accountants, and business administrators. The extraordinary number of mergers and acquisitions taking place in the U.S. today is a sign of this trend, and is important in the context of the hearing in that corporate shake-ups of this sort are unsettling and counterproductive to those who plan and carry out long-term development programs. For example, a number of major industrial R&D facilities have been adversely affected recently by these actions -- to the amazement of our foreign competitors.

Next in importance, in my judgment, is the relatively uncomfortable relationship that exists among the governmental, industrial, academic, and public information sectors of the U.S. What is more, this relationship fluctuates rather wildly in consonance with the political temper of the times, so that it is difficult to predict what the future might portend. The concept of working together for the national good seems to rejected except in times of war. For example, why should it be considered inappropriate for the Government to place a high priority on industrial R&D and to support this function with public funds? Every other country in the world does this. In the U.S. we find it necessary to hide part of the Government support for the innovation process by cloaking it in the mantle of national security -- thereby making it less effective and limiting it to a considerable extent to the large defense contractors and the national laboratories. It appears to be the consensus that we are rich enough to accommodate this kind of inefficiency, but the budget deficit and the negative balance of trade indicate otherwise.

I hesitate to rank in third place rather than first place the failure of our educational system to produce the kinds of engineers and scientists (including technical managers) that we need now and will need even more in the future. My only reason for doing so is this issue seems to have the longest and most uncertain time constant for change, and it is also a result of the other problems previously discussed. We have no national education policy to speak of, at least in the sense that all educational institutions are dedicated to following a path designed to meet the national purpose. Instead, our educational system is market-driven, so our best students are going into the non-technical professions in the prospect that there is where the money is. Furthermore, it is not enough to merely increase the numbers of technical people being graduated; they must also be better than the world average in competence -- including being able to read and digest the foreign technical literature. It is a demonstration of both democracy at work and our inability to cope with major problems at the national level that most of the limited Federal funds for education go toward improving the lot of the disadvantaged, and very little toward improving technical literacy. Apparently the States will have to assume the burden of providing a better educational environment for scientists and engineers, but we must realize that as a consequence there will be great variability among the States in how successful they are.

It goes almost without saying that the above factors strongly influence the degree to which research programs in the U.S. are receptive to acquiring and using Japanese (and other foreign) technical information. Perhaps the best thing that can happen to us is that we come to the realization -- uncomfortable and unhappy as it is -- that the U.S. has no monopoly on scientific accomplishment or industrial innovation, and that we must try harder to maintain our position or, in some instances, to catch up. To do so makes it absolutely imperative that we be aware of foreign technical advances while they are occurring, not after foreign products enter the marketplace. In my opinion, this is a daunting task for small companies in the U.S., many of which are trying to be innovative on a world scale in their own right. Large companies are doing better in this regard, but the process must become part of the conventional R&D approach and not be a reaction to perceived crisis. Strangely, universities do not appear to be doing enough in this regard, although keeping up with international science has been a traditional part of academic research. I will address possible solutions to this issue below.

2. Your report on the demand for Japanese technical information concluded that the short term nature of U.S. R&D programs is at fault in inhibiting U.S. interest in foreign scientific and technical information. What efforts would you recommend to help business overcome this bias?

In looking for solutions to the apathy we observe in the U.S. R&D community toward finding and using foreign technical information, it seems to me that it is absolutely necessary for the U.S. Government to take the lead by example and as a matter of national policy to expand its own activities in this regard and also to provide support for others to do so.

Dr. Christopher Hill of the Congressional Research Service has dwelt at length on proposed actions that might be taken by the Federal Government. I support his proposals and will not repeat them here. However, I do have some further thoughts for the Subcommittee's consideration.

I regret to say that previous reliance on the National Technical Information Service to perform the function of acquiring and disseminating foreign technical information has not been sufficient, primarily because of the restraint placed on NTIS that it must operate out of revenues and not from appropriations. NTIS could remain the clearinghouse for foreign technical information acquired through Government auspices, but other Federal agencies with R&D responsibilities should be charged with making this function a specific and identified part of their activities and to budget for it accordingly. Otherwise, it will be lost in the budget and operational shuffle.

The best example in my mind of how this could be accomplished lies within the National Science Foundation. Consideration has been given there to making the use of foreign technical information a discrete mandate in the requests for proposals for the creation of university-industry research centers and to the more recently conceived research and development centers, but the idea has languished for reasons that are not completely known to me. I suspect that budgetary considerations have overruled this approach, but there may be other reasons as well. If pursued more aggressively, this arrangement would bring both universities and their industrial partners into the fold of involvement with foreign technical information, and it might prove to be infectious.

As the DOE and DOD national laboratories become more committed to transferring technology to the industrial sector, it would seem fitting for them also to have formal programs in place for absorbing foreign technical information and insuring that the information obtained in placed in the hands of private companies and universities. This is being done to some extent by these two large departments (the activities of the Office of Naval Research are specifically noteworthy in this regard), but the national laboratories and FFRDCs do not appear to be consistent or even committed to this function. With their well-developed technical information divisions, they have the manpower and other resources to carry out this responsibility if it is placed on them by their parent agencies.

Another little-known agency of the Federal Government, the Foreign Broadcast Information Service (FBIS), performs a yeoman's task in obtaining technical documentation (not scientific papers) published in other countries, translates it, and disseminates it to users. One version of the FBIS reports is unclassified and can be obtained for a fee through NTIS. The other version -- and by far the more important one -- is marked "Official Use Only" and goes to a handful of Government and contractor users. Apparently, the restriction is due to copyright rules that limit broader distribution. Since other countries do not honor the international copyright rules to the extent that the U.S. does, it would appear appropriate for the U.S. Government to negotiate copyright agreements with other important countries to permit wider dissemination of this valuable and timely material.

The Office of Japanese Technical Literature in the Department of Commerce, created under the aegis of the Japanese Technical Literature Act of 1986, is a good start in this direction, but it is hamstrung by lack of a budget appropriation from the Congress. Consideration should be given to not only putting some money where Congress' mouth is but to expanding the responsibilities of the Office to include countries other than Japan. Also, I believe that the primary function of this Office should be one of management, assessment, and evaluation and that it should not be burdened with an operational role of performing or funding translations of documents. It will never have the staff or funds to carry out this latter task. That could be left to the subordinate agencies of Commerce such as NBS, NTIS, and NOAA, and the other Federal agencies already mentioned.

Finally, turning to industry itself, it will do no good for the Congress to simply exhort the industry to pay more attention to foreign technical advances. That is already being done by the National Academies of Science and Engineering and by a number of professional societies. Neither can the Congress regulate an interest in this field. What is left is the traditional power of the Congress: to fund or subsidize activities that it believes are in the national interest. I support the proposals made by others at this hearing that revival of the R&D tax credit would be useful in making private investment in R&D more attractive financially to the private sector. All other advanced countries offer this advantage. Also, I believe that the Congress should reconsider the role of NTIS and should provide sufficient funding to NTIS to permit it to take a broader and more imaginative approach to its services. Such funding could also be used effectively to at least partially subsidize the cost of publications to the user community, helping in particular the smaller companies and universities. I recognize that increased budgets are not popular in the Congress, the Administration, or among the public. However, if the issue that is being discussed is as important as the Members say it is, then the Congress should establish a higher priority for acquiring and using foreign technical information through the appropriations process than it now enjoys. However, the old saw about leading a horse to water but not being able to make him drink applies here and is reflected in my previously prepared testimony: increasing the supply of technical information from abroad does not provide assurance that it will be used. I have been unable to think of any way that the Congress can overcome this impasse through its own actions, and the rule of the marketplace may be the only solution.

3. You indicate that the Commerce Department is currently evaluating the feasibility of establishing a Japanese translation consortium to pool translations performed in both the public and private sectors. Do you think this is a cost-effective approach and are you in favor of it?

Many complaints are received about the cost and time involved in making Japanese-to-English technical translations. The number of translations actually performed is further limited by the availability of competent technical translators. Therefore, on the face of it, there appears to be merit from the cost-effectiveness view in pooling

completed translations to serve a wider audience than the organizations which originally commissioned the translations. However, a number of uncertainties remain to be resolved. First, there is no accurate record of the number and type of translations being performed; somehow this must be determined so that an estimate can be made of whether the effort required to form and administer a consortium will pay off in terms of increased usage. Second, there is some conjecture that private companies may not wish to relinquish their translations, either because in doing so they may reveal a proprietary interest in a subject or field or because their investment in making the translation gives them at least a momentary competitive edge. Third, the question of whether copyright approvals can be obtained to disseminate translated documents beyond the limits imposed by copyright protection must be assessed. Fourth, procedures for compensating the administering organization for its costs -- and possibly the translators for imputed lost revenues -- must be established in a way and at a magnitude that will not jeopardize the intent of the service. I believe that all of these uncertainties can be overcome to an extent sufficient to make the system workable.

Once again, it remains to be determined whether the demand for translations from the pool will meet expectations. A particularly important consideration in this respect will be the timeliness of translations. If they are not surrendered to the pool until after months or years have gone by, their value will be decreased markedly. Since many technical fields will be covered, it may be impossible to forecast the demand prior to establishing the pool. Nonetheless, I believe that the translation consortium be further developed and put into operation if the uncertainties noted above are overcome. Even if a large demand does not materialize, much will be learned about the need for performing translations on the wholesale basis recommended by some.

ROBERT A. ROE, New Jersey, CHAIRMAN

GEORGE E. BROWN, JR., California
JAMES H. SCHEUER, New York
MARILYN LLOYD, Tennessee
DOUG WALGREN, Pennsylvania
DAN GLICKMAN, Kansas
HAROLD L. VOLKMER, Missouri
BILL NELSON, Florida
RALPH M. HALL, Texas
DAVE McCURDY, Oklahoma
NORMAN Y. MINETA, California
BUDDY MacKAY, Florida
TIM VALENTINE, North Carolina
ROBERT G. TORRICELLI, New Jersey
RICK BOUCHER, Virginia
TERRY BRUCE, Illinois
RICHARD H. STALLINGS, Idaho
JAMES A. TRAFICANT, JR., Ohio
JIM CHAPMAN, Texas
LEE H. HAMILTON, Indiana
HENRY J. NOWAK, New York
CARL C. PERKINS, Kentucky
TOM McMILLEN, Maryland
DAVID E. PRICE, North Carolina
DAVID R. NAGLE, Iowa
JIMMY HAYES, Louisiana
DAVID E. SKAGGS, Colorado

U.S. HOUSE OF REPRESENTATIVES

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

SUITE 2321 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
(202) 225-6371

MANUEL LUJAN, JR., New Mexico
ROBERT S. WALKER, Pennsylvania
F. JAMES SENSENBRENNER, JR., Wisconsin
CLAUDINE SCHNEIDER, Rhode Island
SHERWOOD L. BOEHLERT, New York
TOM LEWIS, Florida
DON RITTER, Pennsylvania
SID MORRISON, Washington
ROB PACKARD, California
ROBERT E. SMITH, New Hampshire
PAUL S. HENRY, Michigan
HARRIS W. FAWELL, Illinois
D. FRENCH SLAUGHTER, JR., Virginia
LAMAR SMITH, Texas
ERNEST L. KONNYU, California
JACK BUECHNER, Missouri
JOEL HEFLEY, Colorado
CONSTANCE A. MORELLA, Maryland

HAROLD P. HANSON
Executive Director
ROBERT C. KETCHAM
General Counsel
R. THOMAS WEIMER
Minority Staff Director

May 16, 1988

Ora E. Smith, Director
External Technical Development
Rockwell International Corporation
P.O. Box 1085
Thousand Oaks, CA 91360

Dear Mr. Smith:

On behalf of the Subcommittee on International Scientific Cooperation, I would like to thank you for your recent insightful testimony on Sharing Foreign Technology. Your testimony will be very useful to the Subcommittee as it weighs legislative options in this critical area of scientific cooperation.

Due to time constraints, we were unable to ask some questions we believe are important to fully understand this issue. We have enclosed these questions and request that you respond to them within two weeks. We have also included a copy of your transcribed testimony in order that you may correct, for the printed record, any transcriptional or typographical errors.

Once again, we would like to thank you for your excellent testimony on Sharing Foreign Technology. If you have any questions, please contact Virginia Gold of the Subcommittee staff at (202) 226-3636.

Sincerely,

Ralph M. Hall

RALPH M. HALL, Chairman
Subcommittee on International
Scientific Cooperation

RMH/Gls
Enclosures

SUBCOMMITTEE ON INTERNATIONAL SCIENTIFIC COOPERATION

Hearing on "Sharing Foreign Technology:
Should We Pick Their Brains?"

April 27, 1988

ADDITIONAL QUESTIONS FOR MR. ORA SMITH

1. You cite the taxation issue as a real obstacle to extended stays in foreign countries by U.S. citizens for business purposes. And you advocate negotiations with Japan to produce a tax treaty to allow U.S. expatriates to be taxed at more favorable rates.

   a. Is it generally recognized that this is an obstacle inhibiting extended stays by U.S. expatriates in Japan?

   b. How receptive will the Japanese be to this proposal for negotiation to establish more favorable rates?

2. You advocate major federal R&D funding for machine translation as a way of improving access to foreign technology.

   a. Is there widespread support for this idea in the business community, as far as you know?

   b. Do you know of industries which may be interested in commercializing machine translation technology?

3. You indicate that Japanese research institutions are opening up to U.S. researchers, partly as a result of the pressure brought by U.S. negotiators during bilateral diplomatic agreements.

   a. Is it your opinion that U.S. participants in these programs are gaining access to worthwhile information or are they restricted to second-rate research opportunities?

   b. How can small businesses, which are often unable to devote full-time resources abroad or to establish a laboratory overseas, acquire foreign technical information?

Ora E. Smith
Director
External Technology Development

1049 Camino Dos Rios
Thousand Oaks, California 91360

(805) 373-4644

Rockwell International

May 23, 1988

OS88.112

The Honorable Ralph M. Hall
Chairman, Subcommittee on International Scientific Cooperation
Committee on Science, Space, and Technology
U.S. House of Representatives
Suite 2321 Rayburn House Office Building
Washington, D.C. 20515

Dear Representative Hall:

If was my pleasure to testify before your subcommittee, and I am now very pleased to address the follow-up questions which you sent me on May 16.

Question 1: **You cite the taxation issue as a real obstacle to extended stays in foreign countries by U.S. citizens for business purposes. And you advocate negotiations with Japan to produce a tax treaty to allow U.S. expatriates to be taxed at more favorable rates.**

a. Is it generally recognized that this is an obstacle inhibiting extended stays by U.S. expatriates in Japan?

b. How receptive will the Japanese be to this proposal for negotiation to establish more favorable rates?

Response: I believe it is generally recognized that the combination of U.S. and Japanese taxes is an obstacle inhibiting extended stays by U.S. expatriates in Japan. According to my sources in Japan, including a representative of a major U.S.-based accounting firm, this problem is very current and very real. The ACCJ (American Chamber of Commerce in Japan) and APCAC (Asia Pacific Council of American Chambers) have worked on this problem for several years with no success. In fact, I am told that three years ago the situation worsened when the Japanese National Tax Agency (NTA) suddenly became much stricter in its collection of taxes from American expatriates.

Rockwell
International

Concerning how receptive the Japanese would be to negotiating a tax arrangement, to date neither the U.S. nor the Japanese tax agencies have been very receptive to proposals from private business. Both countries note that their policies are "non-discriminatory," and that therefore American companies should not complain. I think American companies operating in Japan are reluctant to approach the National Tax Agency very aggressively for fear of triggering retributive actions. While reponse of the Japanese to entreaties by U.S. businessmen has not been very encouraging, I think the Japanese government would react much more positively to an approach through official U.S. Government channels.

Question 2: **You advocate major federal R&D funding for machine translation as a way of improving access to foreign technology.**

a. Is there widespread support for this idea in the business community as far as you know?

b. Do you know of industries which may be interested in commercializing machine translation technology?

Response: I believe there is widespread support in the industrial R&D community operating in Japan for federal R&D funding of machine translation. Good Japanese to English translation of technical literature currently cost about 2000 Yen ($16) per page because it is very time consuming and must be done by people who have some expertise in the field involved. The American Chamber of Commerce in Japan (ACCJ) High Tech Committee has established a translation pool whose first project is a 1000+ page document on telecommunications. Total cost for this document, for which only selected portions will be translated will be over $10,000. The high cost in this case is leading to an attempt to form a consortium to share the cost, and while this project will probably proceed, the general problem of translation pools, whether privately or publicly funded is that either (1) the document you want translated is very specific to your own present business requirements and not to those of your colleagues, or (2) the document you want is not something you want to share with your colleagues because you want to keep a competitive edge over them.

One solution is to have Japanese staff do translation, but only really large companies can afford that. Even a company the size of Rockwell needs to keep its technical people occupied with actual technical access and can't

Rockwell
International

allow them to spend more than a tiny fraction of their time translating documents. The situation is devastating for small companies, who cannot afford access to anything that isn't already on the shelves in translated form.

Concerning the issue of which industries may be interested in commercializing machine translation technology, I think it is of interest to companies in the computing and data processing fields, although it could become a completely new business of great size and profitability if technical breakthroughs occur. To the best of my knowledge, the only companies strongly pursuing machine translation are Japanese companies, including Nippon Electric Company (NEC), Fujitsu, and Hitachi.

Question 3: **You indicate that Japanese research institutions are opening up to U.S. researchers, partly as a result of the pressure brought by U.S. negotiators during bilateral diplomatic agreements.**

a. Is it your opinion that U.S. participants in these programs are gaining access to worthwhile information or are they restricted to second-rate research opportunities?

b. How can small businesses, which are often unable to devote full-time resources abroad or to establish a laboratory overseas, acquire foreign technical information?

Response: The quality of information that we are accessing is limited much more by the quality and quantity of personnel we provide than by any policy of the Japanese government to restrict our access. The foreign companies who win big are those who establish large, subject-specific R&D staff in Japan.

Small businesses are seriously restricted in their ability to acquire foreign technical information. Small concerns, lacking the ability to place their own people overseas, must rely on the U.S. government, trade and professional associations, expensive foreign technology consultants of varied quality and effect, and informal relationships with other businessmen. As I mentioned earlier, machine translation would help the small businessman substantially. In the meantime, the small businessman's best resources remain the federal government, journal subscriptions, and trade associations.

The ACCJ High Tech Commitee will soon be publishing a survey of 90 Western scientists who have worked in Japan. If your staff would like to obtain the results of this survey please let me know.

It has been my pleasure to answer your questions, and I hope my comments have been of help to the Committee.

Respectfully submitted,

ROBERT A. ROE, New Jersey, CHAIRMAN

GEORGE E. BROWN, JR., California
JAMES H. SCHEUER, New York
MARILYN LLOYD, Tennessee
DOUG WALGREN, Pennsylvania
DAN GLICKMAN, Kansas
HAROLD L. VOLKMER, Missouri
BILL NELSON, Florida
RALPH M. HALL, Texas
DAVE McCURDY, Oklahoma
NORMAN Y. MINETA, California
BUDDY MacKAY, Florida
TIM VALENTINE, North Carolina
ROBERT G. TORRICELLI, New Jersey
RICK BOUCHER, Virginia
TERRY BRUCE, Illinois
RICHARD H. STALLINGS, Idaho
JAMES A. TRAFICANT, JR., Ohio
JIM CHAPMAN, Texas
LEE H. HAMILTON, Indiana
HENRY J. HOWAR, New York
CARL C. PERKINS, Kentucky
TOM McMILLEN, Maryland
DAVID E. PRICE, North Carolina
DAVID R. NAGLE, Iowa
JIMMY HAYES, Louisiana
DAVID E. SKAGGS, Colorado

U.S. HOUSE OF REPRESENTATIVES

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

SUITE 2321 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
(202) 225-6371

MANUEL LUJAN, JR., New Mexico
ROBERT S. WALKER, Pennsylvania
F. JAMES SENSENBRENNER, JR., Wisconsin
CLAUDINE SCHNEIDER, Rhode Island
SHERWOOD L. BOEHLERT, New York
TOM LEWIS, Florida
DON RITTER, Pennsylvania
SID MORRISON, Washington
RON PACKARD, California
ROBERT C. SMITH, New Hampshire
PAUL B. HENRY, Michigan
HARRIS W. FAWELL, Illinois
D. FRENCH SLAUGHTER, JR., Virginia
LAMAR SMITH, Texas
ERNEST L. KONNYU, California
JACK BUECHNER, Missouri
JOEL HEFLEY, Colorado
CONSTANCE A. MORELLA, Maryland

HAROLD P. HANSON
Executive Director
ROBERT C. KETCHAM
General Counsel
R. THOMAS WEIMER
Republican Staff Director

May 16, 1988

Tomoyuki Satoh, President
T. Satoh & Co., Inc.
1850 M Street, NW, Suite 1050
Washington, DC 20036

Dear Mr. Satoh:

On behalf of the Subcommittee on International Scientific Cooperation, I would like to thank you for your recent insightful testimony on Sharing Foreign Technology. Your testimony will be very useful to the Subcommittee as it weighs legislative options in this critical area of scientific cooperation.

Due to time constraints, we were unable to ask some questions we believe are important to fully understand this issue. We have enclosed these questions and request that you respond to them within two weeks. We have also included a copy of your transcribed testimony in order that you may correct, for the printed record, any transcriptional or typographical errors.

Once again, we would like to thank you for your excellent testimony on Sharing Foreign Technology. If you have any questions, please contact Virginia Gold of the Subcommittee staff at (202) 226-3636.

Sincerely,

Ralph M. Hall

RALPH M. HALL, Chairman
Subcommittee on International
Scientific Cooperation

PMH/Gls
Enclosures

SUBCOMMITTEE ON INTERNATIONAL SCIENTIFIC COOPERATION

Hearing on "Sharing Foreign Technology:
Should We Pick Their Brains?"

April 27, 1988

ADDITIONAL QUESTIONS FOR MR. TOMOYUKI SATOH

1. Dr. Christopher Hill has indicated that the shortfall in demand for foreign technical information may be due to a mismatch between the kind of information that is useful to researchers, and the format in which it is presented. But in your view, the shortfall is based on factors that are more fundamental, such as an unwillingness on the part of Americans to recognize the need for developing the human resources necessary to handle Japanese technical information.

   a. What do you mean by the "necessary human resources?"

   b. How do other countries handle this problem? Can we learn something from them?

2. In your statement, you support Dr. Hill's suggestion to offer tax incentives to business in exchange for the use of Japanese information.

   a. Could you expand on this idea?

   b. How would it help facilitate the flow of foreign scientific and technical information to this country?

3. You acknowledge that there has been a globalization of commerce, as businesses compete and cooperate on a worldwide basis. And yet you say that American business is unprepared to access Japanese information.

   a. Is it your position that U.S. businesses may be losing their competitive edge because of this lack of preparedness?

   b. Should we be pessimistic about the outlook for U.S. business in the future because of this situation, or in your opinion is there reason to hope that the situation will change, and American business will become more receptive to Japanese scientific and technical information?

TSC T. Satoh & Co., Inc.
1155 Connecticut Avenue, N.W., Suite 500, Washington, D.C. 20036 USA 202-785-1160 (office) 223-8428 (fax)

May 31, 1988

Hon. Ralph M. Hall, *Chairman*
Subcommittee on International
Scientific Cooperation
Room 822, House Annex #1
Washington, DC 20515

Dear Mr. Chairman:

Thank you for the opportunity to testify on the issue of accessing Japanese scientific and technological information on April 27, and I would like to apologize for the delay in responding to your questions.

As you may already know, Japanese Technical Information Service (JTIS), currently the world's largest source of Japanese technical information available in English - the service I originated back in '83 and developed since '84 with funding from University Microfilms International (UMI), then a Xerox publishing division and now a Bell & Howell subsidiary - is scheduled to be phased out at the end of June because of low usage by US corporations. In view of the current low demand in the U.S. for Japanese information and the leveraged buy-out of Bell & Howell Company that has just taken place, the continuation of JTIS is no longer viable for UMI.

I am a firm believer in the long-term potential of the Japanese information business in the U.S., and have thus far devoted 5 years of my life to it. I have learned in these five years, however, that establishing real U.S. access to Japanese information requires a commitment to offer (1) a wide range of information products and services and (2) very strong educational programs and services to educate and train potential customers. Based on this view, I am currently in the process of launching a new business to be known as CIBER (Center for International Business Education Resources), Inc. Based in Washington, D.C., CIBER will offer a variety of value-added information, research and educational products and services to the corporate, government and academic markets. CIBER will tap into the extant and future expert knowledge bases on international business, scientific, technological and cultural issues, and will make extensive use of database management and desktop publishing technologies to develop information, research and educational products and services that will meet the diverse and specific needs of today's information consumers. During its initial few years of operation, CIBER will strive to become *the* center of information and activities concerning US-Japan scientific, technological, business and cultural issues. In later years, CIBER will expand its programs to include other Pacific Rim nations, Latin America, the Soviet Union and Europe.

Specifically, CIBER will pursue the following major objectives:

(1) Establishing symmetrical access to scientific, technological and business information between the U.S. and Japan by developing electronic and print services that will meet the diverse and specific needs of U.S. and Japanese corporate and government decision makers, researchers, educators, consultants and entrepreneurs.

(2) Developing links to U.S. and Japanese (and eventually other nations') electronic databases to provide SDI (Selective Dissemination of Information), custom research and analysis services.

(3) Building an international resources database (CIBER-bASE) and network (CIBER- NET) of business, technical, educational, political and cultural events & experts.

(4) Effecting orderly business globalization by developing and offering seminars, conferences and innovative educational programs for U.S. and Japanese corporate and government decision makers, researchers, educators, consultants and entrepreneurs.

The contemplated start-up of CIBER is July 1, contingent upon my ability to obtain the necessary financing. CIBER is an effort to supersede all previous efforts (including my own JTIS) to establish real access to Japanese information, and will become a significant contributor to establishing a balanced exchange of information between the United States and Japan.

Now, let me attempt to answer your questions.

1.a. First of all, I would like to point out that the notion of "demand-product mismatch" concerning Japanese information presupposes the existence of a "willing and able" information consumer here in the U.S. My contention is that there are not too many "willing and able" Japanese information consumers at present. My view seems to be supported by the unfortunate outcome of my own JTIS effort, as well as by studies conducted to date on the subject, including the recent study by Mr. Justin Bloom. As this has been pointed out over and over again in the past several years, at numerous conferences as well as during Congressional hearings on the subject of Japanese information accessibility, Japanese information has always been just as accessible to all foreigners as to the Japanese. In other words, in terms of "pure accessibility," the state of "symmetrical access" to information between the U.S. and Japan has always existed, at least for the past few decades. When we discuss "information access," we tend to focus on information delivery mechanisms, and tend to forget that information access involves three major entities: namely, the information originator, the delivery mechanism (i.e., information service providers and their products, delivery equipment and channels, etc.), and the information consumer. Roughly speaking, the openness of both the American and Japanese societies assures us that the information originator is willing to communicate his/her thoughts through the efforts of publishing, and has thus created a body of raw information to be turned into information products. From then on, however, the two nations seem to follow different paths. Japan, as a nation, has made English language education an integral part of its pre-college curricula; likewise, individual Japanese corporations have been encouraging their employees to learn foreign languages - they now encourage their employees to learn at least one additional foreign language besides English. Meanwhile, language education seems to remain a low priority item for American corporations. If there is a mismatch, then it is only logical to assume that a mismatch certainly exists in Japan as well. We know, however, that the Japanese have done a much better job of accessing foreign (especially U.S.) information despite at least the same degree of mismatch they may have had to face as that which may have confronted Americans. Therefore, even though in the final analysis there may exist a "demand-product mismatch," we have to conclude that it is not a fundamental factor - the Japanese have certainly overcome it. That leaves the American information consumer as the key to this puzzle. First of all we can readily recognize that the consumer has virtually no prior knowledge of Japan or the Japanese language, and may not know where to start. Second, the information services and products identified (usually with a great deal of difficulty) are likely to be less than ideal - no information products or services rarely exactly match consumer needs, requiring the consumer to conduct further investigation or analysis. It is likely that a series of inquiries must be made before the consumer finally obtains the information originally sought, but every step in the process is difficult because of the lack of knowledge and experience about Japan of the consumer (and intermediaries). Since accessing information is rarely a single-step process,

the capability of each person in the step (including that of the consumer) has a multiplicative effect on the entire process. The process could become rather involved, and may test the degree of determination of not only the consumer but of the intermediaries as well. In the process of information access, the capabilities of the people comprising the access chain play a very significant role. That is what I mean by "necessary human resources." Here I am not saying that the Japanese are inherently more capable than American. Rather, I am saying that when it comes to accessing technical (and other) information, the Japanese on the average are better prepared than Americans. Remember that the result is multiplicative. In my view, it is clear that establishing physical means of accessing Japanese information is only a part of the picture, but the cultivation of people here in the U.S. who are capable of processing Japanese information is the more pressing issue. As I testified, and Senator Rockefeller also indicated in his testimony, I am aware that the U.S. is currently not even taking advantage of the precious few people it has trained in Japanese through its educational system. While Japanese corporations have tens of thousands of people stationed in the U.S., and many of them understand English, relatively few American corporations have their personnel stationed in Japan, and very few of them understand the local language of choice, i.e., Japanese. In terms of the sheer number of people involved, the Japanese advantage is at least 10 to 1, if not 100 to 1. To summarize, I believe the U.S. must do the following:

(1) Immediately start utilizing Americans trained in the Japanese language and culture. Why cannot the government offer tax incentives to corporations that employ such people for the specific purpose of developing their business in/with Japan? The concept can certainly be expanded to cover other nations. Can the government somehow encourage corporations to adopt a merit pay system tied to language/cultural training? Doesn't the State Department already have a system like that?

(2) The long-term solution, but actually one solution that we can bet our life on that will produce results, is language education. We must increase the number of people proficient in the language. The Japanese Ministry of Education (MOE) has been offering Japanese language scholarships to Americans, and many of the Americans proficient in the language today have been trained through this channel. Japan, in its own effort to internationalize itself, is eager to accept foreigners into its educational system today. So, perhaps the U.S. and Japanese governments can consider a large-scale student exchange program encompassing pre-college, college and post-graduate levels, and send more young Americans to Japan. Assuming that the Japanese are willing to share half of the cost, the U.S. government's share would be about $15,000 a year. An annual commitment of $15 million can send 1,000 young Americans to Japan. Or, perhaps, the government can provide some seed money to establish a fund to which American (and perhaps even Japanese) corporations can contribute - they can "sponsor" young Americans in Japan.

(3) Help develop various pre-college and college programs in the Japanese language. There are several successful models already existing, such as the MIT-Japan Science & Technology Program.

1.b. In the case of Japanese corporations, they made their commitment decades ago to keep abreast of foreign technical and business developments. Their commitment, in real terms, means their commitment to education, the number of people they send to and station in the U.S., the amount of money they spend to license U.S. technologies, and so forth. One could certainly argue that they had to make that commitment to catch up with the West and they made the commitment because of their dependence on the large U.S. market for growth. However, it does not change the fact that the commitment made by the Japanese has turned out to be the right commitment for the up-coming era of globalization. I do not see why the U.S. government and corporations cannot make that same commitment today.

2.a. & b. I specifically support two types of tax incentives - one on the consumer side, and another for the supplier side. Due to the small size of the existing market, Japanese technical information products and services could be expensive. In the case of Japanese Technical Information Service, its initial product, which was a monthly abstract journal, was priced at $5,000 per year for private corporations and $2,950 per year for academic institutions. Many felt the prices were too high (yet, in the case of large corporations, this was another excuse they used to avoid dealing the issue), and opted not to subscribe. However, these prices were directly indicative of the production costs involved. As much as JTIS wanted to offer products at much lower prices, we were not able to lower the prices in view of the production cost which was in the millions of dollars annually. In his report, Dr. Hill of the Congressional Research Service points out that tax credit carry-forwards (which, in essence, is a form of delayed subsidy program) may be of value to start-up operations such as JTIS. The JTIS experience indicates that a start-up operation proposing to offer Japanese information services on a large scale may require a minimum of 5 years of continuous investment, at a clip of millions of dollars in investment each year. In the case of a database service, it is not uncommon for the service to require 5-7 years of continuous investment before breaking even. Indeed, most of the established and profitable database services we see today belong to nonprofit organizations or government organizations to whom profitability has not been an issue (e.g., NTIS, Chemical Abstracts Service, Engineering Information, to name a few). Therefore, a business that proposes to be engaged in offering Japanese technical information service must necessarily have a long-term view, in which case tax credit carry -forwards covering a period of 10-14 years could be a strong incentive and help increase the number of suppliers joining the field. To summarize, a large-scale Japanese information service business takes millions of dollars a year invested for several years to launch. Anyone launching such a business, therefore, must make a long-term commitment to the business, in which case a long-term tax credit carry-forwards can be an incentive. However, the supplier still has to face the issue of production cost vs. price-sensitivity, and tax credits offered to consumers (effectively reducing the cost to the consumers) would be a significant marketing tool. From the cost -effectiveness standpoint, tax credit carry-forwards will have virtually no impact on tax revenue until such time that the supplier starts showing a profit, in which event the federal government has succeeded in bringing about an economically-viable Japanese information accessing program. Tax incentives to consumers may have a short-term negative impact on federal tax revenue, but improvement in the competitiveness of businesses opting to use Japanese information should be more than enough a return on investment by the government in time.

3.a. & b. The world of business is going global, whether American businesses realize that or not, and whether they are prepared for it or not. This globalization is taking place, partially because of rapid technological advancements (especially telecommunications and computer technologies). The globalization of the financial market is a prime example of that. Over a long haul, however, it probably does not matter whether "American" businesses are currently losing their competitive edge because of their unpreparedness to access Japanese information, since in the end there will be only corporations operating globally, and not "Japanese" or "American" corporations as we know them today. However, it is safe to assume that American businesses will not be occupying the same prominent positions that they have occupied in the past several decades. In a way, I feel that the fact that the U.S. has held as prominent a position as it has has been a historical anomaly, and not the norm. One of the ways to answer your first question is to ask the following question: "Will the U.S. be more competitive if it were better prepared for the business globalization?" Once we realize that "globalization" actually means "better understanding of local local market characteristics," I believe the answer is self-evident. In any event, the loss of competitive edge by U.S. businesses would be a gradual one, and even a logical one from a historical perspective. But, I may add that I do not see any clear indication that U.S. businesses are ready to reverse the trend anytime soon. Having said all this, I am optimistic about the future - otherwise I would not be in this business, although to a large extent the future depends on how successful we will be in establishing real access to Japanese information in this country.

To say that there is no hope is to admit that we are not going to try, for the future depends on whether we act now or not. Will American businesses become more receptive to Japanese scientific and technological information? The logic says they will have to, for those that become receptive will survive and grow, and those that do not will perish in the global marketplace.

Again, I thank you for this opportunity to participate in this worthwhile discussion. I will look forward to further working with the Subcommittee on this issue in the future.

Respectfully yours,

Tom Satoh, *President*
T. Satoh & Co., Inc.

P.S. Pleas note my recent address change. My new office address is as follows:

T. Satoh & Co., Inc.
1155 Connecticut Ave., N.W., Suite 500
Washington, D.C. 20036 U.S.A.
202-785-1160 (office) 223-8428 (fax)

ROBERT A. ROE, New Jersey, CHAIRMAN

GEORGE E. BROWN, JR., California
JAMES H. SCHEUER, New York
MARILYN LLOYD, Tennessee
[illegible] WALGREN, Pennsylvania
DAN GLICKMAN, Kansas
HAROLD L. VOLKMER, Missouri
BILL NELSON, Florida
RALPH M. HALL, Texas
DAVE MCCURDY, Oklahoma
NORMAN Y. MINETA, California
BUDDY MacKAY, Florida
TIM VALENTINE, North Carolina
ROBERT G. TORRICELLI, New Jersey
RICK BOUCHER, Virginia
TERRY BRUCE, Illinois
RICHARD H. STALLINGS, Idaho
JAMES A. TRAFICANT, JR., Ohio
JIM CHAPMAN, Texas
LEE H. HAMILTON, Indiana
HENRY J. NOWAK, New York
CARL C. PERKINS, Kentucky
TOM McMILLEN, Maryland
DAVID E. PRICE, North Carolina
DAVID R. NAGLE, Iowa
JIMMY HAYES, Louisiana
DAVID S. SKAGGS, Colorado

U.S. HOUSE OF REPRESENTATIVES

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

SUITE 2321 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
(202) 225-6371

May 16, 1988

MANUEL LUJAN, JR., New Mexico
ROBERT S. WALKER, Pennsylvania
F. JAMES SENSENBRENNER, JR., Wisconsin
CLAUDINE SCHNEIDER, Rhode Island
SHERWOOD L. BOEHLERT, New York
TOM LEWIS, Florida
DON RITTER, Pennsylvania
SID MORRISON, Washington
RON PACKARD, California
ROBERT C. SMITH, New Hampshire
PAUL B. HENRY, Michigan
HARRIS W. FAWELL, Illinois
D. FRENCH SLAUGHTER, JR., Virginia
LAMAR SMITH, Texas
ERNEST L. KONNYU, California
JACK BUECHNER, Missouri
JOEL HEFLEY, Colorado
CONSTANCE A. MORELLA, Maryland

HAROLD P. HARRISON
Executive Director
ROBERT C. KETCHAM
General Counsel
B. THOMAS WIMBISH
Republican Staff Director

Barry Beringer, Associate Under
Secretary for Economic Affairs
U.S. Department of Commerce
Washington, DC 20230

Dear Mr. Beringer:

On behalf of the Subcommittee on International Scientific Cooperation, I would like to thank you for your recent testimony on Sharing Foreign Technology, which was submitted in response to our request. Your testimony will be very useful to the Subcommittee as it weighs legislative options in this critical area of scientific cooperation.

We have prepared some follow-up questions which we believe are important to fully understand this issue. These questions are enclosed, and we would appreciate your cooperation in responding to them within two weeks.

Once again, we would like to thank you for your testimony on Sharing Foreign Technology. If you have any questions, please contact Virginia Gold of the Subcommittee staff at 226-3636.

Sincerely,

Ralph M. Hall

RALPH M. HALL, Chairman
Subcommittee on International
Scientific Cooperation

RMH/Gls
Enclosure

SUBCOMMITTEE ON INTERNATIONAL SCIENTIFIC COOPERATION

Hearing on "Sharing Foreign Technology:
Should We Pick Their Brains?"

April 27, 1988

ADDITIONAL QUESTIONS FOR DEPARTMENT OF COMMERCE

1. Your efforts, as presented in your testimony, to increase the public's awareness of existing Japanese scientific and technical information is exemplary. But as you know, private sector efforts to market Japanese technical information have not been successful, due principally to lack of demand.

   a. Can you shed any light on why demand for this information is not as strong as it might be, given its generally acknowledged contribution to the nation's competitiveness?

   b. What activities is your agency prepared to pursue to stimulate demand from public and private users for this information? Do you think professional and technical associations have a larger role to play in matching user needs with available resources?

2. Testimony by Dr. Justin Bloom indicates that the Department of Commerce is currently evaluating the feasibility of establishing a Japanese translation consortium to pool translation performed in both the public and private sectors.

   a. What is the status of this project?

   b. How do you intend to "market" it to potential users of translated materials?

   c. Is this project expected to be cost-effective, and if not, what other financing arrangements have been made?

3. Your testimony states that the demand expected from information users for Japanese scientific and technical information requires more cultivation, but you appear to be wary of the results of increased budget outlays for your Japanese Technical Literature office to influence this demand.

   a. What do you mean by cultivation? Is there a cultural bias against pursuing foreign science and technology?

   b. Is the issue of intellectual property rights and the related fear of losing out on the fruits of one's research inhibiting interest in pursuing foreign scientific and technical study?

   c. If your agency did receive the doubling of funds requested in the Fiscal Year 1989 budget request, would your priorities, programs, or organization structure for the JTL office change?

d. Would you favor the creation of an independent Office of Technology Information charged with collecting, analyzing, and disseminating all relevant foreign scientific and technical data?

4. As you know, the Executive Order on Facilitating Access to Science and Technology directs Federal agencies involved in negotiating cooperative research and licensing agreements with foreign interests to consider whether comparable research and development, and licensing opportunities, are offered to U.S. citizens and companies by the countries represented in these negotiations, and whether these agreements protect U.S. intellectual property rights. A similar provision exists in the Federal Technology Transfer Act.

a. How has your agency implemented this provision?

b. Are you aware of instances where preference was given to prospective foreign research and licensing partners whose countries provide comparable opportunities and protection for U.S. interests abroad?

c. To your knowledge, have any foreign research partners or licensing partners of U.S. interests been denied approval of research or licensing agreements by any agency of the U.S. government as a result of this provision?

5. Dr. Christopher Hill presented a series of programmatic options for Federal Government action to access foreign scientific and technical information in a recent report. A copy of this report is enclosed.

a. Please assess these options in terms of their cost-effectiveness and compatibility with your ongoing efforts to access foreign scientific and technical information.

House Subcommittee on International
Scientific Cooperation

Questions and Answers for the Department of Commerce

Q.1.a. Can you shed any light on why demand for this information is not as strong as it might be, given its generally acknowledged contribution to the nation's competitiveness?

Answer: We attempted to systematically address this question through sponsorship of a survey on demand for Japanese technical information in the field of advanced ceramics. The survey was conducted for the Office of Japanese Technical Literature by Justin Bloom, who provided a thorough summary of the results at the April 27th hearing. While we cannot extrapolate the results to other fields, the survey report does provide a snapshot view of current efforts in the U.S. technical community to acquire and utilize Japanese technical information. The results confirmed — intuitive judgements about the current lack of demand, which is related to the limitations of archival literature, language problems and a cultural/business environment which is not always receptive to the acquisition and use of foreign technical information. Some of these factors are highlighted below.

First, there are inherent problems with published technical literature where the time lag between discovery and publication often makes the information obsolete before it reaches the hands of the reader. This problem is compounded when dealing with Japanese language material which must be translated. Personal contacts and on-site lab visits provide much more direct and timely information, although the cultural and language differences make this a difficult undertaking in Japan.

Second, the volume of technical information coming out of Japan, (often estimated at about 10,000 scientific journals) exacerbated by the language barrier, makes it difficult to evaluate the material. Some sort of screening mechanism such as a workable machine translation system is needed to identify the most important literature and make it more accessible to a U.S. audience. Translated material available through government and private sources needs to be better organized and disseminated.

For these reasons, many potential consumers of Japanese information see Japan and its scientific establishment, as a "black hole" impenetrable by foreigners. The most avid readers of Japanese technical literature are those who know exactly what they are looking for or have been given guidance that effect. Demand for Japanese literature can be expected to grow concurrent with increased knowledge of Japan and its scientific establishment. However, literature is only a component of information exchange and will not in and of itself fill all user needs. Development and use of electronic databases and establishment of personal contacts in Japan are examples of other efforts that should be carried out concurrently.

Q.1.b. What activities is your agency prepared to pursue to stimulate demand from public and private users for this information? Do you think professional and technical associations have a larger role to play in matching user needs with available resources?

Answer: The Office of Japanese Technical Literature has attempted to stimulate demand by increasing awareness of existing resources. As noted in the written testimony submitted for the hearing this is done through annual publication of the "Directory of Japanese Technical Resources," the report to Congress on Federal Government activities, and reports on important Japanese scientific discoveries and technical innovations.

The office has developed a newsletter highlighting activities of the Office and other areas of the Department of Commerce as well as agencies such as the National Science Foundation, the Department of Energy, and the National Aeronautics and Space Administration. Monthly NTIS acquisitions and highlights of key Japanese technical innovations are also included. This publication, will be sent to R&D executives of U.S. companies, consulting firms, and appropriate scientific/technical personnel in government and academia starting in June-July.

Professional and technical societies do have an important role to play in matching user needs with available resources. The office is soliciting advice from technical experts associated with numerous societies and associations to obtain their assistance

in distributing user surveys. We are also asking these groups to provide opportunities at society meetings for OJTL staff to highlight our publications and other resources for information. In conjunction with this activity, the office is compiling comprehensive journal lists available through better established commercial and public sources showing the source, method of access, and when possible, summarizing content.

Q.2.a. What is the status of this project?

Answer: The Consortium has met three times to discuss matters of importance to member organizations related to the sharing of collections of foreign scientific and technical information (STI), especially that of Japanese origin.

The initial purpose of the Consortium is to facilitate the sharing of collections of information already in U.S. hands, and not primarily to seek new foreign sources of information.

The major obstacle to such sharing so far uncovered is uncertainty with regard to the copyright status of translations of foreign documents. This uncertainty prevents several large organizations from making their collections of foreign STI available outside of their own companies of laboratories.

Meeting agendas and lists of attendees are available from NTIS.

Q.2.b. How do you intend to "market" it to potential users of translated materials?

Answer: "Marketing" plans are still evolving. Primary announcement and dissemination organizations will be the National Translations Center (NTC), John Crerar Library, University of Chicago, the Office of Japanese Technical Literature (OJTL), DOC and NTIS.

The NTC has a collection of translated foreign STI which it makes available for a fee. In cooperation with the International Translations Center in Delft, The Netherlands, the NTC is making its bibliographic data- base publicly available on line via Dialog Information Services. Consortium materials will be announced and promoted through the NTIS and NTC databases and other announcement media.

Ildiko Novak, Director of the NTC, and Sabina Javits of the OJTL have attended the Consortium sessions held to date. Tim Feinstein of the NTIS Office of International Affairs initiated the Consortium and has chaired the meetings.

Q.2.c. Is this project expected to be cost-effective, and if not, what other financing arrangements have been made?

Answer: All time devoted to Consortium activities to date has been donated by member organizations (membership is currently informal). Documents will either be donated to the NTC or deposited with NTIS under standard procedures, or will be provided on demand by member organizations. NTC and NTIS operations will continue to be self-supporting.

Selection of officers, establishment of formal membership requirements, including dues payments and financing of resources required beyond those likely to be donated in the future, will be discussed at the next meeting. That meeting is scheduled for June 13, 1988 at AT&T Bell Laboratories Murray Hill, New Jersey.

Q.3.a. What do you mean by cultivation? Is there a cultural bias against pursuing foreign science and technology?

Answer: Despite evidence to the contrary we are optimistic that there is a latent demand for Japanese information which needs to be encouraged and cultivated. We believe this can be done by making access as easy and comprehensive as possible. There is a cultural bias against pursuing foreign science and technology perhaps to the extent that American engineers are trained to be innovative rather than imitative. As a result they tend not to seek out information on existing research and may reinvent the wheel. In the case of Japan, American's lack of understanding of the culture and language presents an additional obstacle which could be labelled "provincialism."

Q.3.b. Is the issue of intellectual property rights and the related fear of losing out on the fruits of one's research inhibiting interest in pursuing foreign scientific and technical study?

Answer: This has not been apparent in the case of Japan where it is widely assumed that the Japanese have already gained access to, and continue to acquire information

on U.S. science and technology. The problem is more one of awareness and motivation.

Q.3.c. If your agency did receive the doubling of funds requested in the Fiscal Year 1989 budget request, would your priorities, programs, or organization structure for the JTL office change?

Answer: The doubling of funds requested in the Fiscal Year 1989 budget request would not change the Office of Japanese Technical Literature significantly. Total funding for the Office would remain relatively stable, as fulfillment of this request would assure appropriated funds for the entire annual office budget which at present operates in part on reprogrammed funds.

Q.3.d. Would you favor the creation of an independent Office of Technology Information charged with collecting, analyzing, and disseminating all relevant foreign scientific and technical data?

Answer: No, the National Technical Information Service performs this function now. It is now coordinating its efforts for expanding its coverage of such material under Executive Order 12591 with the Department of State and the National Science Foundation. No additional organizational structure is necessary.

Q.4.a. How has your agency implemented this provision?

Answer: At the present time, emphasis is being placed on obtaining the necessary information about foreign practices to assist lab directors in making the evaluations required by the Order and the Act. At the request of the United States Trade Representative, the Department of Commerce has agreed to serve as the central clearinghouse within the Executive branch for the collection of information on relevant foreign practices regarding access of U.S. personnel to foreign research facilities and the ability of U.S. citizens to pursue similar R&D arrangements. The Department published a request for information from the public in the Federal Register on April 21, 1988. A press release was picked up by the wire services and the trade press has made inquiries. If the trade press follows through, it could generate a substantial response. The information will be made available to laboratory directors considering agreements involving

particular countries. It will also be used to establish strategy for U.S. diplomats negotiating bilateral science and technology agreements with countries identified as having policies that deny comparable opportunities to U.S.

Q.4.b. Are you aware of instances where preference was given to prospective foreign research and licensing partners whose countries provide comparable opportunities and protection for U.S. interests abroad?

Answer: We are not. As a technical matter, we wish to note that we do not interpret the Act or the Order as requiring that a preference be given to such foreign interests. Rather, we read both as merely permitting the lab director to count discriminatory practices against U.S. personnel by a particular country as a negative when evaluating competing proposals for cooperative research.

Q.4.c. To your knowledge, have any foreign research partners or licensing partners of U.S. interests been denied approval of research or licensing agreements by an agency of the U.S. government as a result of this provision?

Answer: We have no such information at the present time. Agencies are still in the process of developing administrative procedures for compliance with the various provisions of the Order and the Act.

Q.5.a. Please assess these options in terms of their cost-effectiveness and compatibility with your ongoing efforts to access foreign scientific and technical information.

Answer: Mr. Hill outlines some very valid policy options. All have merit, but as, Mr. Hill indicates, involve significant Federal expenditures. Prior to the establishment of the Office of Japanese Technical Literature, we estimated that the Federal Government is spending in the range of $2-3 million annually on activities related to the acquisition and dissemination of Japanese technical literature. Because this informal estimate was done over one year ago it is reasonable to assume that the number has grown. It is clear that much of the current government-sponsored information needs to be better disseminated to industry, although as Mr. Hill also indicates the demand for this information is not as

yet very strong. Thus, while few question the link between competitiveness and access to foreign technical information, large Federal outlays at this juncture may result in the creation of well-intentioned, but under utilized projects and programs. For this reason, the Office of Japanese Technical Literature has focused its efforts on encouraging greater use of existing resources.

ROBERT A. ROE, New Jersey, CHAIRMAN
GEORGE E. BROWN, JR., California
JAMES H. SCHEUER, New York
MARILYN LLOYD, Tennessee
DOUG WALGREN, Pennsylvania
DAN GLICKMAN, Kansas
HAROLD L. VOLKMER, Missouri
BILL NELSON, Florida
RALPH M. HALL, Texas
DAVE MCCURDY, Oklahoma
NORMAN Y. MINETA, California
BUDDY MacKAY, Florida
TIM VALENTINE, North Carolina
ROBERT G. TORRICELLI, New Jersey
RICK BOUCHER, Virginia
TERRY BRUCE, Illinois
RICHARD H. STALLINGS, Idaho
JAMES A. TRAFICANT, JR., Ohio
JIM CHAPMAN, Texas
LEE H. HAMILTON, Indiana
HENRY J. NOWAK, New York
CARL C. PERKINS, Kentucky
TOM MANDELL, Maryland
DAVID E. PRICE, North Carolina
DAVID R. EAGLE, Iowa
JIMMY HAYES, Louisiana
DAVID S. SKAGGS, Colorado

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
SUITE 2321 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
(202) 225-6371

MANUEL LUJAN, JR., New Mexico
ROBERT S. WALKER, Pennsylvania
F. JAMES SENSENBRENNER, JR., Wisconsin
CLAUDINE SCHNEIDER, Rhode Island
SHERWOOD L. BOEHLERT, New York
TOM LEWIS, Florida
DON RITTER, Pennsylvania
SID MORRISON, Washington
RON PACKARD, California
ROBERT C. SMITH, New Hampshire
PAUL G. HENRY, Michigan
HARRIS W. FAWELL, Illinois
D. FRENCH SLAUGHTER, JR., Virginia
LAMAR SMITH, Texas
BARNEY L. KOMPITU, California
JACK BUECHNER, Missouri
JOEL HEFLEY, Colorado
CONSTANCE A. MORELLA, Maryland

HAROLD P. HANSON
Executive Director
ROBERT C. KETCHAM
General Counsel
R. THOMAS WEIMER
Republican Staff Director

May 16, 1988

Richard J. Smith, Acting Assistant Secretary
Bureau of Oceans and International Environmental
and Scientific Affairs
U.S. Department of State
Washington, DC 20520

Dear Mr. Smith:

On behalf of the Subcommittee on International Scientific Cooperation, I would like to thank you for your recent testimony on Sharing Foreign Technology, which was submitted in response to our request. Your testimony will be very useful to the Subcommittee as it weighs legislative options in this critical area of scientific cooperation.

We have prepared some follow-up questions which we believe are important to fully understand this issue. These questions are enclosed, and we would appreciate your cooperation in responding to them within two weeks.

Once again, we would like to thank you for your testimony on Sharing Foreign Technology. If you have any questions, please contact Virginia Gold of the Subcommittee staff at 226-3636.

Sincerely,

Ralph M. Hall

RALPH M. HALL, Chairman
Subcommittee on International
Scientific Cooperation

RMH/Gls
Enclosure

SUBCOMMITTEE ON INTERNATIONAL SCIENTIFIC COOPERATION

Hearing on "Sharing Foreign Technology:
Should We Pick Their Brains?"

April 27, 1988

ADDITIONAL QUESTIONS FOR DEPARTMENT OF STATE

1. In describing the pilot program known as STRIDE (Science and Technology Reporting and Information Disseminating Enhancement), your testimony states that reports from State Department science and technology officers in selected capitals are given to evaluators in government, industry, and academia.

   a. Who are these evaluators, and what are they being asked to assess?

   b. Could you describe the role of the STRIDE program in determining the level of interest in other agencies for these reports from embassy S&T officers? Are these reports also circulated to private sector organizations?

   c. What recommendations do you have for developing STRIDE into a full-fledged program should SRI approve its continuation on a larger scale? Does it involve additional personnel at selected embassies? An increase in funding for the program?

2. Your testimony indicates that cables from the PRC on biotechnology were distributed to a variety of public and private sector organizations, and that they generated some interest from a professional association.

   a. Why do you think this series of cables was successful in attracting additional attention? Was it related to format, content, packaging, or some other factors?

   b. Has it resulted in generating interest on the part of U.S. scientists and engineers to pursue research opportunities in the PRC?

   c. Would you recommend a larger role for professional associations in acquiring and disseminating scientific and technical information to users, and in generating interest among those users for pursuing research opportunities abroad?

3. What are the major obstacles to the pursuit of research opportunities abroad encountered by U.S. researchers? Inadequate language facility? Insufficient travel funds? A bias against foreign technical achievements? Interruption of careers objectives?

4. Under the recently negotiated bilateral science and technology agreement with Japan, the Japanese agreed to "comparable access to major government-sponsored or government-supported programs and facilities for visiting researchers...." But this provision implies that there is sufficient interest on the part of U.S. scientists and engineers to warrant this access. Unfortunately, this does not seem to be the case.

   a. What steps, if any, is the State Department recommending to take advantage of the opportunities made available by Japanese research institutions under this agreement? Additional funding for fellowships? Greater centralization of information on overseas research opportunities? Allocation of funds to private or professional organizations to promote research opportunities?

   b. There is a common perception that the U.S. is allowing more of our technology to leave the country than is being provided to us from opportunities abroad. To date, has this led to any restrictions on foreign access to U.S. scientific and technical developments?

5. As you know, the Executive Order on Facilitating Access to Science and Technology directs the Secretary of State to develop a recruitment policy encouraging U.S. scientists and engineers to serve in U.S. embassy assignments abroad.

   a. How has this provision been implemented within your agency? Has it led to any increase in science officers posted overseas?

   b. How successful has your agency been in attracting technical personnel to these posts?

6. This Executive Order also directs Federal Agencies involved in negotiating cooperative research and licensing agreements with foreign interests to consider whether comparable research and development, and licensing opportunities are offered to U.S. citizens and companies by the countries represented in these negotiations, and whether these agreements protect U.S. intellectual property rights. A similar provision exists in the Federal Technology Transfer Act.

   a. How has your agency implemented this provision?

   b. Are you aware of instances where preference has been given to prospective foreign research and licensing partners whose countries provide comparable opportunities and protection for U.S. interests abroad?

   c. To your knowledge, have any prospective foreign research partners or licensing partners of U.S. interests been denied approval of research or licensing areements by any agency of the U.S. government as a result of this provision?

7. Dr. Christopher Hill presented a series of programmatic options for Federal Government action to access foreign scientific and technical information in a recent report. A copy of the report is enclosed.

   Please assess these options in terms of their cost-effectiveness and compatibility with your ongoing efforts to access foreign scientific and technical information.

HH/ISC

United States Department of State

Washington, D.C. 20520

June 6, 1988

RECEIVED

JUN 8 1988

Dear Mr. Chairman:

Following the submission of testimony on Sharing Foreign Technology, additional questions were submitted for the record.

Please find enclosed the responses to those questions.

Sincerely,

J. Edward Fox

J. Edward Fox
Assistant Secretary
Legislative Affairs

Enclosures:
as stated

The Honorable
Robert A. Roe, Chairman,
Committee on Science, Space, and Technology,
House of Representatives.

Q: 1. In describing the pilot program known as STRIDE (Science and Technology Reporting and Information Dissemination Enhancement), your testimony states that reports from State Department science and technology officers in selected capitals are given to evaluators in government, industry, and academia.

a. Who are these evaluators, and what are they being asked to assess?

b. Could you describe the role of the STRIDE program in determining the level of interest in other agencies for these reports from embassy S&T officers? Are these reports also circulated to private sector organizations?

c. What recommendations do you have for developing STRIDE into a full-fledged program should SRI approve its continuation on a larger scale? Does it involve additional personnel at selected embassies? An increase in funding for the program?

A: a. There are two groups of evaluators who examine specific subject areas in the distributed STRIDE materials. Under a contractual agreement, SRI International developed a list of approximately 30 individuals from its network of consultants to receive and review material. These people primarily are involved in technical aspects of research and development in the fields of superconductivity, advanced structural ceramics, and advanced microelectronics. A listing of these evaluators is attached (Attachment 1). SRI International also has asked additional appropriate individuals to evaluate miscellaneous topical reports in areas other than the three major disciplines.

A second group of evaluators developed informally out of the OES Bureau's original and continuing efforts to respond positively to E.O 12591. Attachment 2 lists these individuals. This group of evaluators differs from that of SRI International in that many are involved in policy-level decisions at their respective government agency or industrial corporation.

In both cases, the evaluators are asked to assess the information pertaining to their area of expertise and interest. SRI includes an evaluation questionnaire (Attachment 3) with each mailing of STRIDE information. The Bureau has been less formal in soliciting evaluations from individuals on its mailing list. The recipients were invited to respond, and a number of letters have been received over the past five months, generally praising the efforts of the STRIDE project. A questionnaire (Attachment 4) similar in content to the one prepared by SRI recently was included with STRIDE materials. The primary difference in the Bureau's questionnaire is in asking respondents if they would be interested in receiving the materials electronically.

It should be noted that the individuals on the Bureau's mailing list frequently act as focal points for distributing the information to other interested parties. For example, NTIS and ONR make some of the material available for distribution through their own networks. Through this route, the reports have the potential of reaching hundreds of individuals.

b. S&T reports from our embassies are routinely distributed to various other government agencies, including a number of entities within the Department of Commerce, the National Science Foundation, and the Department of Energy. Early in the STRIDE program, government agencies were sent a memorandum asking them to contribute materials that might be distributed to appropriate individuals and organizations under the auspices of E.O. 12591. The initial response of agencies other than the National Technical Information Service (NTIS) of the Department of Commerce and the National Science Foundation was minimal. However, as other agencies have become aware of the STRIDE program through the efforts of the OES Bureau, interest in receiving the information and providing access to internal documentation has increased.

The Office of Japanese Technical Literature in the Department of Commerce, the Office of S&T Information of the Department of Energy, the Office of Strategic Materials of the U.S. Bureau of Mines, and the International Affairs Offices of the National Academy of Sciences and the National Academy of Engineering routinely receive information under the STRIDE program. In addition, S&T reporting from our embassies is now routinely addressed to the Branch Office of the Office of Naval Research (ONR) in either Tokyo or London in addition to the Office of the Chief of Naval Research in Arlington, Va. Exchanges of information also occur with the Foreign Broadcast Information Service (FBIS) and the Defense Technical Information Center (DTIC).

The STRIDE program has focused attention on the need to coordinate and standardize the distribution procedures. The Department of State has instituted several steps to ensure that interested parties in other government agencies receive the embassy reports which can now be distributed in their original cable form, in reformatted easy-to-read hard copy, and in any of several electronically transmitted computerized formats.

Private sector trade organizations were a source of names of qualified experts in the areas of superconductivity, advanced structural ceramics, and advanced microelectronics. The U.S. Advanced Ceramics Association (USACA) and the American Electronics Association (AEA) were particularly helpful in this respect as was the National Academy of Engineering. The Council on Superconductivity for American Competitiveness intends to use some of the STRIDE-generated information in their next newsletter. Miscellaneous specialized reports also are distributed to appropriate professional associations.

c. As a point of clarification, SRI International is under contract to conduct a six-month pilot study to determine interest in materials generated through the STRIDE project. A meeting to review the results of the pilot project is scheduled for mid-June at which time SRI will present its findings. STATE, NTIS and NSF will then decide the next steps to be taken in response to E.O. 12591.

The essential question for the future is how to provide the most efficient mechnism for distribution to appropriate end-users. Several options have been discussed, and even though no single mechanism has been

settled on, there are several observations that will impact on the final decision. First, the Executive Order states that government-held information will be distributed to the private sector for a fee, a service similar to that already performed by NTIS. Second, it appears from experience with the pilot project that the reporting from the embassies needs to have value added in the form of summaries and highlights in order to achieve the widest possible distribution of the most useful information. Third, rapid dissemination of the material is essential to ensure utility for the private sector. This can best be accomplished through the use of electronic communications systems. Finally, there is considerable interest among specific users for the types of information provided by the embassy S&T officer, e.g., policy decisions, budgets, and interviews with government- and science-policy makers.

Over the long term, full implementation of the Executive Order could require a review of resource allocation priorities at some embassies and in the Department. To produce an S&T report that is more than a repeat of published information in the country of origin,

requires considerable development of background information, the generation of specific information for the report, as well as the actual writing of the report. It is not unreasonable to expect that a full-time individual working on STRIDE might produce about 10 reports per year under optimal circumstances. One solution to the staffing problem is to assign scientists, engineers and other technical people for short periods of time (i.e., one to six months) to specific embassies for the purpose of reporting on particular technologies. Embassy Tokyo has been participating in such a program where the visitor is primarily funded by and reporting to another government agency. In return the embassy provides living quarters, office space and secretarial support. Obviously, the cost of such a program will vary widely depending upon the country where it is conducted.

ATTACHMENT 1.1

STRIDE

Evaluators and Institutions

National Laboratories -

Dr. Samuel Schneider (Structural Ceramics)
Special Assistant to the Director
Institute for Materials Science and Engineering
National Bureau of Standards
Gaithersburg, MD 20899

Dr. Steve Freeman - 975-5761 (Superconductivity)
National Bureau of Standards
Building 223, Room A-329
Gaithersburg, MD 20899

Dr. Roger Poeppel - 312/972-7928 (Structural Ceramics)
Building 212
Argonne National Laboratory
Argonne, Il 60439

Dr. Norman E. Phillips - 415/486-6062 (Superconductivity)
Director, Division of Materials and
Chemical Sciences
66-246
Lawrence Berkeley Laboratory
Berkeley, CA 94720

Dr. Lutgard DeJonghe - 415/486-6138 (Structural Ceramics)
Senior Scientist
Lawrence Berkeley Laboratory
62-203
Berkeley, CA 94720

Dr. Eugene Haller - 415/486-5294 (Microelectronics)
Professor of Material Science and
Mineral Engineering
Lawrence Berkeley Laboratory
70A-3307
Berkeley, CA 94720

Vendors

Mark F. Eaton - 512/338-3600 (Microelectronics and Computer Tech.)
Microelectronics and Computer
Technology Corporation
International Liaison Office
3500 West Balcones Center Drive
Austin, TX 78759 (agreed to distribute packages to appropriate scientists and engineers within the corporation)

Vendors (Cont.)

Herman Baron - 215/499-7415
Diane Publishing
600 Upland Avenue
Upland, PA 19015

Catherine Grissom - 615/576-5761
Science and Technology Division
DOE Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831 (Agreed to distribute packages to appropriate evaluators in the organization)

Michael Radnor - 312/491-5145 (Microelectronics and structural ceramics)
Center for the Study of U.S. - Japan Relations and Center for Interdisciplinary Study at Northwestern University
626 Library Place
Evanston, IL 60201

Jack Kinn - 457-4900 (Superconductivity and microelectronics)
Vice President for Engineering
Electronic Industries Association
2001 Eye Street NW
Washington, D.C.

Joel Shuster - 612/829-9000
Tel Tech Resource Network
9855 West 78th Street
Minneapolis, MN 55344

Ron Hegelson
Tel Tech Resource Network
9855 West 78th Street
Minneapolis, MN 55344

Rich DiCicco - 703/237-9600 (Structural Ceramics)
Technology Catalysts, Inc.
6073 Arlington Boulevard
Falls Church, vA 22044

Monica Pronin - 212/944-8500
Senior Vice President
EIC/Intelligence
48 W. 38th Street
New York, NY 10018

Universities with Foreign Technology Information Programs

Ray Chapman - 425-3946 (Microelectronics)
George Mason University
4400 University Drive
Fairfax, VA 22030

Engineering Research Centers

Professor Greg Stillman - 217/333-3097
Research Center for Compound Semiconductor
Microelectronics
312 Electronic Research Lab
106 South Burrill Avenue
Urbana, IL 61880

Dr. Azar Majidi
Assistant Professor
Department of Mechanical Engineering
University of Delaware (Affiliate with Center for
Newark, Delaware 19716 Composites Manufacturing, Science
& Engineering)

Dr. Tom Seidel
Center for Robotics Systems in Microelectronics
University of California
Santa Barbara, CA 93106 (Microelectronics)

University Bench Scientists

Dr. William E. Spicer - 415/723-4643 (Microelectronics)
Stanford Electronics Laboratory
Stanford, CA 94305

William Blanpied - 617/534-1989
IR/PS Q-062
University of California
La Jolla, CA 92093

Dr. Edward Daub - 608/262-4810 (Microelectronics)
General Engineering Department
University of Wisconsin
1527 University Avenue
Madison, WI 53706

Dr. J. J. Coleman - 217/333-2555 (Microelectronics)
Electrical Engineering Department
University of Illinois
1406 W. Green Street
Urbana, IL 61801

Bench Scientists (Cont.)

Dr. Donald M. Smyth - 215/758-3000 (Superconductivity)
Materials Research Center
Building # 32
Lehigh University
Bethlehem, PA 18015

Dr. F. Thomas Wooten (Microelectronics)
Vice President for Electronics and Systems
Research Triangle Institute
Box 12194
Research Triangle Park, NC 27709

Industrial Laboratories

Dr. Jonathan Scutter (Willing to serve as evaluator and gatekeeper with other scientists at Litton, can handle evaluations in all three fields)
Staff Scientist
Litton Industries
11887 Dublin Boulevard
Dublin, CA 94568

Mr. Dale Mosier (512/244-3500)
President
Carroll Touch Technology, Inc.
P.O. Box 1309
Round Rock, TX 78680

Mr. Bert Weinstein (714/758-4001)
Interstate Electronics
1529 Canyon Lake
Santa Ana, CA 92701

Dr. Daniel Sullivan (213/536-1111)
Vice President, Technology
TRW, Inc.
One Space Park Drive
M/S Building E-2, Room 11063
Redondo Beach, CA 90278

Timothy L. Stone (312/576-4776)
Director of Corporate Analytical Research
Corporate Strategy Office
Motorola, Inc.
1303 Algonquin Road
Schaumburg, IL 60196

Industrial Laboratories (Cont.)

Mr. M. M. Mohajery (Mike) (412/553-4893)
General Manager
Alcoa Conductor Products Company
Technology Marketing Division
Alcoa Building
Pittsburgh, PA 15219

Mr. Dennis Miller (414/274-4000)
Director, Research
Johnson Controls Inc.
P.O. Box 423
Milwaukee, WI 53201

Mr. Geoffrey Clauss, Associate Planner (516/574-1247)
UNISYS
M/S 1P12
Great Neck, NY 11010

ATTACHMENT 1.2

STRIDE Addresee List

Dr. Lewis M. Koppel (c)
Director of Strategic Planning
Standard Oil
Engineered Materials Company
Structured Ceramics Division
P.O. Box 1054
Niagara Falls, NY 14302

Mr. P.M. Wehrenberger (c)
Director of Ceramic Technology
Corhart Inc.
1600 W. Lee St.
P.O. Box 10157
Louisville, KY 40210-0157

Mr. Alan Hart (c)
Senior Research Manager
Central Research
Inorganic Materials &
Catalysis Laboratory
1776 Building
The Dow Chemical Company
Midland, MI 48674

Dr. William G. Howard, Jr. (m)
10642 East San Salvador
Scottsdale, AZ 85258

Dr. John B. Wachtman, Jr. (c)
Director, Center for Ceramics Research
P.O. Box 909
Rutgers University
Piscataway, NJ 08855

Dr. Klaus M. Zwilsky (csm)
Director
National Materials Advisory Board
National Research Council
2101 Constitution Avenue, N.W.
Washington, DC 20418

Mr. Proveen Chaudhari (s)
Vice President Research
IBM T.J. Watson Research Center
P.O. Box 218
Yorktown Heights, NY 10598

Mr. John F. Day, III (csm)
President
Strategies Unlimited
201 San Antonio Circle Suite 205
Mountain View, CA 94040

Dr. John K. Hulm (csm)
Director, Corporate Research and
R&D Planning
Westinghouse Electric Corporation
Research and Development Center
Building 801-3C54M
1310 Beulah Road
Pittsburgh, PA 15235

Dr. Herbert H. Johnson (s)
Professor of Materials Science
Bard Hall
Cornell University
Ithaca, NY 14853

Mr. Lyle Schwartz (cs)
Director, Institute Materials, Science
and Engineering
National Bureau of Standards
Room B310, Building 223
Gaithersburg, MD 20899

Mr. Donald C. Shapero (s)
Staff Director
Board on Physics and Astronomy
National Research Council
Washington, DC 20418

Professor Robert Snyder (s)
Bins-Merrill 2-7
Institute for Superconductivity
Alfred University
Alfred, NY 14802

Dr. William R. Prindle (c)
Associate Director
Research Development and Engineering
Corning Glass Works
Sullivan Park
Corning, NY 14831

Dr. William H. Rhodes (c)
Senior Staff Scientist
GTE Labs, Inc.
40 Sylvan Road
Walthan, MA 02254

Dr. Richard M. Spriggs (c)
Director, Center for Advanced Ceramics
Technology
Alfred University
Alfred, NY 14802

Mr. Avak Avakian (sm)
Vice President
GTE Sylvania System Group
100 Fust Street
Waltham, MA 02254

Mr. Gerardo Beni (m)
Director
Center for Robotics Systems
in Microelectronics
University of California
Santa Barbara, CA 93106

Dr. George H. Kuper (m)
Director
Manufacturing Studies Board
National Research Council
2101 Constitution Avenue, N.W.
Washington, DC 20418

Mr. John T. Pinkston (m)
Vice President and Chief Scientist
3500 West Valcones Center Drive
Austin, TX 78759

Dr. David Wirth (c)
Vice President, Technical Operations
Coors Porcelain Company, Inc.
600 Ninth Street
Golden, CO 80401-1050

Dr. Gordon R. Love (c)
Bldg. C
Alcoa Technical Center
Alcoa, PA 15069

Mr. Terry D. Gulden (c)
Director, Defense Materials
GA Technologies Inc.
P.O. Box 85608
San Diego, CA 92138

Mr. Eugene D. Ervin (c)
General Manager
Performance Ceramics
Air Products and Chemicals, Inc.
Box 538
Allentown, PA 18105

Mr. Roy Rice (c)
W.R. Grace & Company
Route 32
Columbia, MD 21044

Mr. Amar Mishra (c)
Engelhard Corporation
CN 40
Menlo Park
Edison, NJ 08818

Mr. Mario Ecker (c)
IBM Corporation
E. Fishkill Facility
Route 52
Hopewell Junction, NY 12533

Mr. Sidney Stein (c)
Electro-Science Labs
P.O. Box 1059
416 East Church Road
King of Prussia, PA 19406

Mr. Dave Dupre (c)
AVX Corporation
P.O. Box 867
17th Avenue South
Myrtle Beach, SC 29577

Mr. John Jenkins (c)
Coors Ceramics
Structural Groups
600 Ninth Street
Golden, CO 80401

Mr. Gopal Revanker (c)
Deere & Company
3300 River Drive
Moline, IL 61265

Mr. Skip Haugh (c)
MS 540
3901 S. Saginaw Road
Dow-Corning
Midland, MI 48686

Dr. Martha C. Harris (csm)
Office of International Affairs
National Academy of Sciences
2101 Constitution Avenue, NW
Washington, DC 20418

Mr. William Beechum (csm)
Office of S&T Information
U.S. DOE
P.O. Box 62
Oak Ridge, TN 37831

Ms. Catherine P. Ailes (csm)
SRI International
1611 N. Kent St.
Arlington, VA 22209-2173

Mr. William Krist (m)
American Electronics Assn.
Suite 950
1225 I St. N.W.
Washington, DC 20005

Mr. William Salmon (csm)
Executive Officer
National Academy of Engineering
2101 Constitution Avenue, NW
Washington, DC 20418

Mr. Victor Rabinowitch (csm)
Executive Director, Intl. Aff.
National Academy of Sciences
2101 Constitution Aveenue, NW
Washington, DC 20418

Mr. Robert Gallagher (csm)
Office of the General Counsel
Room 6854
Department of Commerce
Washington, DC 20230

Dr. Charles A. Sorrell, Chief (csm)
Office of Advanced Materials Coordination
Bureau of Mines
U.S. Dept. of the Interior
2401 E. Street, NW, MS 4000
Washington, DC 20241

Mr. C.T. Owens (csm)
Office of International Programs
National Science Foundation
1800 G Street, NW
Washington, DC 20550

Dr. Joseph Clark (csm)
Deputy Director
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

Jim Leong (csm)
Headquarters
Office of Global Issues
Central Intelligence Agency
NIO/S&T - Room 3F50
Washington, DC 20505

Dr. Ellen Feinberg (csm)
Coordinator
Superconductivity Information Exchange
12 Physics
Iowa State University
Ames, IA 50011

Pat Hill Hubbard (csm)
Vice President
American Electronics Association
5201 Great American Parkway
Santa Clara, CA 95054

Mr. Steven B. Hellum (csm)
USACA. Suite 300
1440 New York Avenue, NW
Washington, DC 20005

Dr. F.E. Saalfield (csm)
Director
Office of Naval Research
code 10
800 N. Quincy Street
Arlington, VA 22217-5000

Mr. Edward Shykin (csm)
Room H 4045
Department of Commerce
Washington, DC 20230

Mr. Barry C. Beringer (csm)
Associate Under Secretary
for Economic Affairs
U.S. Department of Commerce
Washington, DC 20230

Mr. Art Manfredi (csm)
Headquarters
Central Intelligence Agency
NIO/S&T - Room 7E47
Washington, DC 20505

Mr. George L. Marling (csm)
2626 E. Meredity Drive
Vienna, VA 22180

Dr. Arthur Diness (CSM)
Associate Director
Office of Naval Research
800 N. Quincy Street
Arlington, VA 22217-5000

Marshall C. Phelps, Jr. (m)
IBM Director, Government Programs
Suite 1200
1801 K Street, NW
Washington, DC 20006

R. Dee. Haun, Jr. (m)
Deputy Chief Scientist
Westinghouse Electric Company
R&D Center
1310 Beulah Road
Pittsburg, PA 15235

Tom Burford (m)
Director
AT&T Bell Laboratories
600 Mountain Avenue
Mrray Hill, NJ 07974

Suzanne Tichenor (m)
Director, International Trade Affairs
Cray Research Incorporated
1331 Pennsylvania Avenue, NW
Suite 1331N
Washington, DC 20004

Carmen J. Polermo (m)
Vice President & Chief Scientist
Harris Corporation
Government Systems Sector
MS 2-210, P.o. Box 37
Melbourne, FL 32902

Dr. Michael Dowell (c)
Union Carbide
P.O. Box 6087
Carbon Products Division
Cleveland, OH 44101

Ray Morales (csm)
Los Alamos National Laboratory
P.O. Box 1663
Los Alamos, NM 87545

Neil Ault (csm)
Goddard Road
Northboro, MA 01532

(c) - ceramics (s) - superconductivity
(m) - microelectronics (csm) - all materials

ATTACHMENT 1.3

SRI International
STRIDE Evaluation Form
Superconductivity

Please answer the following questions based on the package of materials relating to superconductivity.

1. How much of the package contained new information?
Very little 1 2 3 4 5 6 7 8 9 10 Almost all

2. How does this package compare in terms of newness with other sources that you use?
Not new 1 2 3 4 5 6 7 8 9 10 Very new

3. How much of the package contained timely information?
Very little 1 2 3 4 5 6 7 8 9 10 Almost

4. How does this package compare in terms of timeliness with other sources that you use?
Less timely 1 2 3 4 5 6 7 8 9 10 More timely

5. Please rate the value of the information in the package to each of these technology management concerns:

Value in terms of scientific and technical advances
Not valuable 1 2 3 4 5 6 7 8 9 10 Very valuable

Value in terms of commercial strategies and applications
Not valuable 1 2 3 4 5 6 7 8 9 10 Very valuable

Value in terms of foreign science and technology policy
Not valuable 1 2 3 4 5 6 7 8 9 10 Very valuable

6. Please note the beginning page numbers of two or three of the most useful pieces of information in the package.

page number	comment
_____	_____
_____	_____
_____	_____

7. Please note the beginning page numbers of two or three of the least useful pieces of information in the package.

page number	comment
_____	_____
_____	_____
_____	_____

8. Would you find this package worthwhile enough to read periodically?

Not worth the time 1 2 3 4 5 6 7 8 9 10 Well worth the time

9. Is the package worthwhile enough for a colleague to read?

Not worth the time 1 2 3 4 5 6 7 8 9 10 Well worth the time

10. Please list, by title or function, particular individuals in your organization who would find this information useful.

_____

_____

_____

11. One important part of this evaluation is to provide follow-up guidance to reporting officers regarding questions based on the package. Please list follow-up questions that you would like to have answered.

_____

_____

_____

_____

Any additional comments on the material would be extremely useful. Please attach additional sheets as necessary.

Return to:
SRI International
Room IS209
333 Ravenswood Ave.
Menlo Park, CA 94025

Q: 2. Your testimony indicates that cables from the PRC on biotechnology were distributed to a variety of public and private sector organizations, and that they generated some interest from a professional association.

a. Why do you think this series of cables was successful in attracting additional attention? Was it related to format, content, packaging, or some other factors?

b. Has it resulted in generating interest on the part of U.S. scientists and engineers to pursue research opportunities in the PRC?

c. Would you recommend a larger role for professional association in acquiring and disseminating scientific and technical information to users, and in generating interest among those users for pursuing research opportunities abroad?

A: a. There are several factors which probably have led to the high degree of interest generated by a five-part Embassy Beijing series on biotechnology in the PRC. First, biotechnology is an area of high public and professional interest. Second, the cables were extremely well written, and the Department made a special effort in electronically reformatting the original telegram into a more easily read style and print. Finally, the most significant factor associated with generating interest in these cables was targeting recipients. A staff member of OES with expertise in the area of biotechnology recognized the value of and potential interest in the reports. Personal contacts within the American Society for Microbiology (ASM) allowed our staff member to direct the reports to the administrative officers

of this professional organization. The timing of the cables also was opportune in that the ASM is co-sponsoring a conference on biotechnology to be held in China in 1990.

b. It is, at the time of this writing, too early to determine the effect such a series of reports might have on stimulating interest in research opportunities in the PRC. The final cable in the series has just recently arrived. The ASM will publish two articles based on the series in the early fall in its monthly newsletter where they will be seen by 35,000 ASM members. NTIS will make the entire text of the series available to their clientele.

Through these means the report will have every opportunity to be the basis for stimulating interest in research opportunities in the PRC. It might be expected that the articles generated from the report will also stimulate interest and attendence at the biotechnology conference in 1990. This, in turn, will allow American scientists the opportunity to interact face-to-face with their Chinese colleagues, review common research interests, and sow the seeds for research cooperation that typically leads to visits and exchanges. A copy of the report series is attached for the committee'S review.

c. The role of professional organizations in acquiring and disseminating foreign S&T information is being explored. These professional organizations possess the talent for producing and assessing highly technical reports, and for distributing them to their members who have similar specialized interests.

In addition, virtually all of these professional organizations publish newletters which could be useful in disseminating government-generated reports to specialized populations. Most also provide travel grants for scientists to attend international conferences and meetings, or to work in a foreign laboratory for short periods of time. Supplemental government funding for some of these programs has the potential of producing high yields in term of S&T information at relatively low costs.

Q: 3. What are the major obstacles to the pursuit of research opportunities abroad encountered by U.S. researchers? Inadequate language facilities? Insufficient funds? A bias against foreign technical achievements? Interruption of career objectives?

A: It is difficult to pinpoint the "major" obstacles to U.S. researchers in pursuing opportunities abroad. Certainly concerns about language, funding, family, and meeting career objectives all play a role in an individual's decision to pursue research opportunities abroad. The language problem is important, but may be less in the professional setting because of the wide use of English in science and technology. The single most asked question with regard to funding is about the cost of living. Scientists with families are concerned about child care, educational facilities, and spouse employment and/or isolation.

Even with all of these technicalities satisfactorily answered, it appears that negative perceptions about the quality of foreign science are a major obstacle. This attitude may be fostered in part by the graduate education system in the U.S. which focuses on original basic research rather than on applied technology. Moreover, much of the foreign scientific literature does not conform to U.S. standards, even though it may prove just as valid as work done in this country.

Finally, U.S. scientists and engineers, especially the younger ones in postdoctoral programs, need to be shown that they have something to gain personally from pursuing research opportunities overseas. Many top-notch young scientists and engineers perceive problems in stepping into career employment immediately after returning from overseas postdoctoral positions. One approach to overcoming this problem might be to offer a 1-1-1 or 1-2-1 year U.S.-foreign-U.S. fellowship program.

Q: 4. Under the recently negotiated bilateral science and technology agreement with Japan, the Japanese agreed to "comparable access to major government-sponsored or government-supported programs and facilities for visiting researchers..." But this provision implies that there is sufficient interest on the part of U.S. scientists and engineers to warrant this access. Unfortunately, this does not seem to be the case.

a. What steps, if any, is the State Department recommending to take advantage of the opportunities made available by Japanese research institutions under this agreement? Additional funding for fellowships? Greater centralization of information on overseas research opportunities? Allocation of funds to private or professional organizations to promote research opportunities?

b. There is a common perception that the U.S. is allowing more of our technology to leave the country than is being provided to us from opportunities abroad. To date, has this led to any restrictions on foreign access to U.S. scientific and technical developments?

A: a. The State Department has been and intends to continue supporting the National Science Foundation (NSF) in its role of encouraging more Americans to take advantage of opportunities in Japan. The NSF has an office in Embassy Tokyo which has been very active in seeking opportunities and transmitting information about them to the NSF offices in Washington. The NSF has also been making funds available to scientists and engineers who wish to study in Japan.

b. We are not aware of any efforts to restrict foreign access to U.S. scientific and technical developments that was not a result of security related concerns.

Q: 5. As you know, the Executive Order on Facilitating Access to Science and Technology directs the Secretary of State to develop a recruitment policy encouraging U.S. scientists and engineers to serve in U.S. embassy assignments abroad.

a. How has this provision been implemented within your agency? Has it led to any increase in science officers posted overseas?

b. How successful has your agency been in attracting technical personnel to these posts?

A: a. The Department of State has taken a number of steps in response to the Executive Order. First, it established in September 1987 a science and technology specialization within the Foreign Service to encourage qualified officers to serve in the S&T field. Efforts to recruit scientific and technologically qualified junior officers have also been enhanced. This systematic approach is expected to pay significant dividends over the long term. In a separate action targetted toward the near term, the Assistant Secretary for Oceans and International Environmental and Scientific Affairs wrote directly to a wide range of officials in other government agencies, academia and industry to bring the Executive Order to the attention of S&T personnel in those organizations. Responses to that letter have been very encouraging.

The total number of science officers posted overseas has not varied significantly during the past five years. The Department is encouraging the short-term overseas assignment of technical agency personnel to meet the need in specialized areas. Preliminary results of this program in Embassy Tokyo have been very encouraging.

b. There are currently 41 full-time science and technology positions at 24 American Foreign Service posts. Twenty-two of the officers assigned to those positions have either S&T degrees or long-term experience in technical fields.

Q: 6. This Executive order also directs Federal Agencies involved in negotiating cooperative research and licensing agreements with foreign interests to consider whether comparable research and development, and licensing opportunties are offered to U.S. citizens and companies by the countries represented in these negotiations, and whether these agreements protect U.S. intellectual property rights. A similar provision exists in the Federal Technology Transfer Act.

a. How has your agency implemented this provision?

b. Are you aware of instances where preference has been given to prospective foreign research and licensing partners whose countries provide comparable opportunities and protection for U.S. interests abroad?

c. To your knowledge, have any prospective foreign research partners or licensing partners of U.S. interests been denied approval of research or licensing agreements by any agency of the U.S. government as a result of this provision?

A: a. The State Department looks at cooperative research agreements in a number on lights, and comparability of access and opportunities is one area that we take into consideration. In those instances where comparable access is desirable, we make that a cornerstone of our policy. In the area of intellectual property protection, agreement language is cleared by both the Department of Commerce and the United States Trade Representative.

b. We do not know of any such case.

c. We do not know of any such case.

Q: 7. Dr. Christopher Hill presented a series of programmatic options for Federal Government action to access foreign scientific and technical information in a recent report. A copy of the report is enclosed.

Please assess these options in terms of their cost-effectiveness and compatability with your ongoing efforts to access foreign scientific and technical information.

A: Dr. Hill's report addressess options for accessing additional foreign S&T information while the STRIDE pilot project was designed to study mechanisms of disseminating information that currently is obtained by the government. Increased access to foreign S&T information would, of course, have a direct effect on the STRIDE project. The following is a point-by-point discussion of the options presented by Dr. Hill, based on experience and impressions gained in establishing the STRIDE project as well as through personal participation in and knowledge of the functional U.S. scientific community.

-- The optimal scale of effort: Designating a percentage of the annual R&D budget to be used for accessing foreign S&T information is perhaps the simplest means of implementing an access program. It also has the potential of being the most wasteful if it does not consider adequately the needs of the clientele (i.e., the

U.S. scientific and technical community) or their willingness to utilize the information. The committee will be aware that one Japanese-translation service recently was discontinued because of lack of subscriptions (interest) for the service. At the most basic level, access to foreign S&T information is governed by supply and demand, and at present there appears to be little demand.

-- Subscriptions to 10,000 Japanese technical journals: While the estimate of 10,000 technical journals being published in Japan may not be far from correct, a question arises as to whether there is a need to access all of them. There is, no doubt, a heirarchy among Japanese technical journals. Of the 10,000 there might be 1,000 to 2,000 of significant interest.

-- Translation of 10,000 Japanese technical journals into English: The discussion above applies here--is there a need to translate all 10,000 journals?

-- Subsidization of short-term travel to Japan by scientists and engineers: Subsidizing short-term visits, especially to attend scientific meetings and conferences, probably would be cost efficient. Such meetings frequently are the site of initial contacts that fluorish and develop into cooperative relationships and exchanges of personnel.

-- Comprehensive journal of technical trip reports: The incorporation of trip reports into a comprehensive journal probably would generate little interest. A better mechanism might be to make them available to professional organizations that could publish excerpts or vignettes in newletters. This would make the material available to large numbers of professionals with similar interests, and would stimulate interest in foreign research and facilities. Additionally or alternatively, if a scientist or engineer is able to get their trip report, or some other aspect of S&T information derived from the trip, published in a professional journal, subsidy of publication costs could be provided.

-- Graduate fellowships for study of Japanese and science or engineering: This program has merit. Intensive study of the Japanese language, however, probably should be undertaken after obtaining the doctoral degree. The rigors of studying Japanese combined with typical graduate work in science or engineering would be expected to lead to a high drop-out rate.

-- Research fellowships for study in Japan: Programs in this area are being developed by the National Science Foundation, the National Academy of Sciences, and the Japanese Science and Technology Agency. However, there are many practical problems that need close attention. Not the least of these is the perception of foreign research held by U.S. scientists and engineers. (See the Answer to Question 2.)

-- Maintenance of a permanent science and engineering mission in Japan: As the National Science Foundation and the Office of Naval Research already have offices in Japan and other countries, additional funding for these would be expected to be relatively cost efficient. Start-up costs would be eliminated and many of the problematic details already have been worked out.

-- Subsidy of translation/abstracting/dissemination journals: Subsidy of any product that does not attract interest or fill a need in the marketplace obviously would be a potential waste of money. Subsidizing the start-up of such projects would have merit, but continued subsidy in the absence of a market should be avoided.

-- Tax incentives for corporate access activities: A tax incentive program has its merits and might be the least expensive option. If the need is great enough, private corporations will establish at least a small facility in the country of most interest. A tax incentive program would allow them to expand their efforts at a lower cost.

-- Federal awareness, education, and training programs: As experience and common sense have taught us, education and training is the best way to influence behavior in both the short-term and in the future. The rewards from a well established, controlled program can be considerable.

-- Sponsoring of research on machine-aided translation: This option has merit and requires further study. There obviously are a number of people (including the Japanese) interested in the basic and applied engineering of translating hardware and software.

-- Extension of the JTECH program to a range of key fields: Again, extension or expansion of a system already in place deserves careful consideration as start-up costs and problematic details to a large degree already have been eliminated. Consideration should be given to expanding JTECH's relatively limited distribution to better serve the needs of the scientific and technical community.

ROBERT A. ROE, New Jersey, Chairman

GEORGE E. BROWN, JR., California
JAMES H. SCHEUER, New York
MARILYN LLOYD, Tennessee
DOUG WALGREN, Pennsylvania
DAN GLICKMAN, Kansas
HAROLD L. VOLKMER, Missouri
BILL NELSON, Florida
RALPH M. HALL, Texas
DAVE MCCURDY, Oklahoma
NORMAN Y. MINETA, California
BUDDY MacKAY, Florida
TIM VALENTINE, North Carolina
ROBERT G. TORRICELLI, New Jersey
RICK BOUCHER, Virginia
TERRY BRUCE, Illinois
RICHARD H. STALLINGS, Idaho
JAMES A. TRAFICANT, JR., Ohio
JIM CHAPMAN, Texas
LEE H. HAMILTON, Indiana
HENRY J. NOWAK, New York
CARL C. PERKINS, Kentucky
TOM MCMILLEN, Maryland
DAVID E. PRICE, North Carolina
DAVID R. NAGLE, Iowa
JIMMY HAYES, Louisiana
DAVID E. SKAGGS, Colorado

MANUEL LUJAN, JR., New Mexico
ROBERT S. WALKER, Pennsylvania
F. JAMES SENSENBRENNER, JR., Wisconsin
CLAUDINE SCHNEIDER, Rhode Island
SHERWOOD L. BOEHLERT, New York
TOM LEWIS, Florida
DON RITTER, Pennsylvania
SID MORRISON, Washington
RON PACKARD, California
ROBERT C. SMITH, New Hampshire
PAUL B. HENRY, Michigan
HARRIS W. FAWELL, Illinois
G. FRENCH SLAUGHTER, JR., Virginia
LAMAR SMITH, Texas
ERNEST L. KONNYU, California
JACK BUECHNER, Missouri
JOEL HEFLEY, Colorado
CONSTANCE A. MORELLA, Maryland

HAROLD P. HARRISON
Executive Director
ROBERT C. KETCHAM
General Counsel
R. THOMAS WEIMER
Republican Staff Director

U.S. HOUSE OF REPRESENTATIVES

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

SUITE 2321 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
(202) 225-6371

May 16, 1988

Charles T. Owens, Section Head
Information and Analysis
National Science Foundation
1800 G Street, NW
Washington, DC 20550

Dear Mr. Owens:

On behalf of the Subcommittee on International Scientific Cooperation, I would like to thank you for your recent testimony on Sharing Foreign Technology, which was submitted in response to our request. Your testimony will be very useful to the Subcommittee as it weighs legislative options in this critical area of scientific cooperation.

We have prepared some follow-up questions which we believe are important to fully understand this issue. These questions are enclosed, and we would appreciate your cooperation in responding to them within two weeks.

Once again, we would like to thank you for your testimony on Sharing Foreign Technology. If you have any questions, please contact Virginia Gold of the Subcommittee staff at 226-3636.

Sincerely,

Ralph M. Hall

RALPH M. HALL, Chairman
Subcommittee on International
Scientific Cooperation

RMH/Gls
Enclosure

SUBCOMMITTEE ON INTERNATIONAL SCIENTIFIC COOPERATION

Hearing on "Sharing Foreign Technology:
Should We Pick Their Brains?"

April 27, 1988

ADDITIONAL QUESTIONS FOR THE NATIONAL SCIENCE FOUNDATION

1. Your testimony refers to the need to help make Japanese research opportunities known to U.S. scientists and engineers, and you suggest the use of state-of-the-art surveys for specific scientific and technical disciplines.

   a. Why has this suggestion not yet been implemented? Is it due a lack of consensus on its effectiveness, or are budgetary considerations more of a factor?

   b. What steps would you recommend to implement this suggestion? What are the obstacles to effective implementation of this suggestion?

   c. How do the reports (current and planned) sponsored by the Commerce Department's Office of Japanese Technical Literature on advanced ceramics; flexible manufacturing systems; biotechnology; supercomputers; and heating, ventilating and air conditioning technology fit into this suggestion?

2. In your testimony, you recommend that our young people seriously examine opportunities for advancing their research careers through first-hand, on site Japanese experience.

   a. What do you see as the obstacles young people may encounter should they choose to pursue this career path?

   b. Is there a greater federal role to be played in providing incentives to these young people to gain first hand Japanese experience? Would that role involve additional funding of existing government programs? Greater centralization of control over collection and dissemination of foreign scientific and technical information? Allocation of funds to start-up or existing private firms for analysis and translation services?

   c. Is the reluctance to pursue these opportunities abroad part of a larger failure of our educational system to prepare students for experiences beyond our borders, and if so, what can NSF do to overcome this failure?

3. Your testimony covers an impressive array of programs and initiatives developed or supported by NSF to improve access to Japanese and other foreign science and technology, including over 100 fellowships in Japanese government research labs.

   a. How are you "marketing" these opportunities to assure adequate demand on the part of U.S. researchers?

   b. What barriers have you encountered in effectively promoting these opportunities to perspective candidates?

   c. Do foreign policies related to proprietary information and intellectual property rights tend to restrict research opportunities for U.S. candidates?

   d. Are U.S. researchers able to take advantage of state-of-the-art scientific and technical developments, or are they restricted to second-rate research opportunities?

4. Your testimony refers to research opportunities made available to U.S. researchers by the Japanese Government.

   a. Could you briefly summarize these opportunities, including how many positions are available, and the level of funds committed by the Japanese Government?

   b. Could you also provide a breakdown of how many of the more than 11,000 scientists and engineers cited in your testimony as involved in exchange visits during the last 27 years were American, and what the trend line for those visits shows about the balance of these visits between the two countries?

5. Dr. Christopher Hill presented a series of programmatic options for Federal Government action to access foreign scientific and technical information in a recent report. A copy of the report is enclosed.

   Please assess the options in terms of cost-effectiveness and compatibility with your ongoing efforts to access foreign scientific and technical information.

HOUSE SUBCOMMITTEE ON INTERNATIONAL SCIENTIFIC COOPERATION

Additional Questions (for NSF) & Answers

1. Your testimony refers to the need to help make Japanese research opportunities known to U.S. scientists and engineers, and you suggest the use of state-of-the-art surveys for specific scientific and technical disciplines.

   a. Q. Why has this suggestion not yet been implemented? Is it due a lack of consensus on its effectiveness, or are budgetary considerations more of a factor?

      A. We have in fact implemented an activity at NSF which will fund state-of-the-art surveys of Japanese research. The attached brochure (NSF 87-67) describes the type of work which can be supported. We have had 4 applications to date for this support, and have supported 1. Basically, we leave the initiative to the scientific community to determine the sub-fields which need highlighting for the benefit of the U.S. research community.

   b. Q. What steps would you recommend to implement this suggestion? What are the obstacles to effective implementation of this suggestion?

      A. To the extent that the U.S. research community does not request support for state-of-the-art surveys, there are likely two main reasons: 1) No need is perceived or 2) the need is there but not recognized. For our part, we can assure that we continue to bring to the attention of American researchers important developments in Japanese S&T at the policy/planning/new program level. We will also continue to encourage more of our researchers to work in Japanese laboratories, from which they can bring back word of possible benefits resulting from paying more attention to work in progress there. Involvement of professional societies in stressing the importance of international awareness could also have a great impact. [See the National Academy of Engineering/the American Society for Engineering Education report]

   c. Q. How do the reports (current and planned) sponsored by the Commerce Department's Office of Japanese Technical Literature on advanced ceramics; flexible manufacturing systems; biotechnology; supercomputers; and heating, ventilating and air conditioning technology fit into this suggestion?

A. In response to the Japanese Technical Literature Act, the Department of Commerce's Office of Japanese Technical Literature is producing annual reports on the topics cited above. These are commerical areas of high technology, i.e., they represent near-term, commerical applications of research. In the case of NSF's state-of-the-art survey reports, the survey topics are focused on more narrowly defined disciplines and are more toward the basic research end of the spectrum. While NSF's reports and those of the Commerce Department essentially represent different parts of the research spectrum, those addressing areas of common interest--biotechnology, for example--may in fact dovetail with each other. In any case, NSF and Commerce maintain ongoing liaison with one another on this subject.

2. In your testimony, you recommend that our young people seriously examine opportunities for advancing their research careers through first-hand, on-site Japanese experience.

a. Q. What do you see as the obstacles young people may encounter should they choose to pursue this career path?

A. Obstacles to extended stays in Japan include:

- Potential loss of job opportunities in the U.S.

- Difficulty in finding employment (at least professional employment) for spouses. Teaching of English and editing jobs are relatively plentiful, however.

- Difficulty in coping with the Japanese way of life, which is quite different from that in the U.S.

- Expenses.

- Schooling for children (especially outside Tokyo).

b. Q. Is there a greater Federal role to be played in providing incentives to these young people to gain first-hand Japanese experience? Would that role involve additional funding of existing government programs? Greater centralization of control over collection and dissemination of foreign scientific and technical information? Allocation of funds to start-up or existing private firms for analysis and translation services?

A. We need to let people know of the opportunities

which exist for access to Japanese laboratories, that the experience gained there may be beneficial to their careers because of available equipment, facilities, and people, and that we can help them with the costs and with adjustment to Japanese life during their research stay.

The availability of opportunities to do important research in Japan will be the critical factor in getting American researchers to go to Japan. That availability requires two components: Japanese willingness to receive our researchers - "openness" in Japanese R&D infrastructure - and resources to support our researchers. The present situation is that the Japanese have made available considerable resources to us and are showing every sign of "openness" (see Answer to question 4). These resources are welcome, and they are appropriate Japanese contributions to "priming the pump" which should bring many more Americans to Japanese laboratories for significant research stays. For the long term, however, it is not in our interest to be dependent upon Japanese resources to get our people to Japan. If we are convinced that it is in our interest to have our researchers in Japanese laboratories, then we must be willing to develop the enabling programs to get them there and to confront the costs that those programs will entail.

The source of funds for the programs resides appropriately with the U.S. government, which can offer the auspices of programs negotiated and agreed with the Japanese - such as those in which NSF is the implementing agency and described in my testimony. The Federal government has a special responsibility in this regard to make it possible for university scientists and engineers to get to Japanese laboratories, since few universities or individual university researchers can routinely make such resources available from their own funds. Industry, too, should have a role here, and this depends upon the recognition of the value to their competitive posture which support for such research visits can bring. Where necessary, NSF's programs, for instance, can provide the access through the auspices of its programs. Industry can be expected, however, to finance the visits and perhaps even to provide additional resources which could be made available to academics through government programs. Funds might be made available from several sources, including the regular budget process, through incremental funding or reprogramming, joint funding, or donations. NSF is committed to substantially increasing the number of our scientists and

engineers who undertake research stays in Japan, and we will continue our efforts to that end.

Various government agencies approach the collection of information about Japanese science and technology along lines of supporting their respective missions. That is the most effective raptionale for such collection activities. Rather than more centralized control of collection, better mechanisms for dissemination would be in order. All unclassified information produced by any agency, for instance, might be required to be sent to a central repository such as NTIS or the Office of Japanese Technical Information in Commerce. Such information - from Japan and other countries - should be offered in whatever scheme is ultimately the result of the pilot study, mentioned in my testimony as a response to Executive Order 12591, and which is being sponsored by the Departments of State and Commerce and NSF.

c. Q. Is the reluctance to pursue these opportunities abroad part of a larger failure of our educational system to prepare students for experiences beyond our borders, and if so, what can NSF do to overcome this failure?

A. There is a widespread perception that a declining number of young American graduate and postdoctoral students are going abroad to do research. NSF has a relatively limited capacity to affect educational policy bearing on the preparation of our people to deal with, and to benefit from events in, the outside world. However, in April 1988 - as part of our Japan Initiative - we announced the availability of fellowships for Japanese language study by American science and engineering graduate students, postdoctorals, and more senior researchers. We do not yet know what the response of the research community will be to this opportunity, though we have about 40 applicants for the first deadline which came only six weeks after the announcement, and we consider that an encouraging start. It is likely that the July closing will bring an even greater response. We are aware that our resources are limited but want to consider whether undergraduates should not also be eligible. If this program is judged effective in encouraging more of our young people to try for research stays in Japan, we will be able to consider whether such fellowships for the study of - say - Korean, Chinese, or other languages might be in order. We also have a separate worldwide program to send young American researchers (less than six years past the Ph.D.) abroad for medium and long-term research visits. The response from the community

to this program so far has been very good.

3. Your testimony covers an impressive array of programs and initiatives developed or supported by NSF to improve access to Japanese and other foreign science and technology, including over 100 fellowships in Japanese government research labs.

   a. Q. How are you "marketing" these opportunities to assure adequate demand on the part of U.S. researchers?

      A. NSF announced its "Japan Initiative" in February, 1988 with a mass mailing of a graphic poster (reduced to 8 1/2 by 11 and attached) which has brought impressive results - to date about 1,000 requests for further information. We are sending out drafts of a series of informational documents describing the JSPS fellowships, the STA fellowships, and our agreement with MITI for access to their laboratories - as well as on NSF's basic Japan Initiative. Through these programs, American researchers have access to literally hundreds of laboratories in the public and private sector in Japan.

      Our announcement of the Japan language fellowships was also mass-mailed to universities throughout the country. Our hand-outs will all bear the same attractive "hallmark" of the red Japanese gate ("tori")-symbolizing the gateway to Japanese laboratories. Including an address for responses by electronic mail has been most effective. In addition, we staffed a booth in the display area of the recent annual meeting of the American Association for the Advancement of Science in Boston to promote the Japan Initiative.

      Other staff in the Division of International Programs have given presentations on the Japan Initiative at universities in Oregon, California, Georgia, Indiana, Montana, and Idaho. More such visits will be undertaken in the coming months. We have publicized the Japan Initiative in NSF's "Bulletin," which has over 10,000 addressees. Stories on the Initiative have appeared in "The Scientist," "Business Week," and several trade and professional association publications.

   b. Q. What barriers have you encountered in effectively promoting these opportunities to prospective candidates?

      A. We have not encountered significant barriers so far.

c. Q. Do foreign policies related to proprietary information and intellectual property rights tend to restrict research opportunities for U.S. candidates?

A. With respect to Japan, I know of no policies that serve to restrict research opportunities for U.S. researchers who would go to university laboratories and to national laboratories. Private concerns which receive our researchers may wish to limit the rights which may accrue to the researcher working in their laboratories. Similar restrictions would be found, I believe, in the case of foreign researchers working in our own laboratories as well. Since the aim of our programs is to concentrate on pre-proprietary research, problems will likely be limited to inventions which may develop while in the receiving laboratory. Each researcher who considers the offer of such a receiving company will have to weigh the benefits associated with the experience to be gained against any restrictions. Each such visit will be open to negotiation between the company and the researcher or his/her institution with respect to the disposition of intellectual property rights.

d. Q. Are U.S. researchers able to take advantage of state-of-the-art scientific and technical developments, or are they restricted to second-rate research opportunities?

A. We expect that the opportunities will be assessed by our researchers in terms of how their research program is likely to benefit. Basically, we would not expect our people to be attracted to second-rate facilities or second-rate opportunities. Nor do we foresee any attempt by our Japanese counterparts to restrict their access along these lines.

4. Your testimony refers to research opportunities made available to U.S. researchers by the Japanese Government.

a. Q. Could you briefly summarize these opportunities including how many positions are available, and the level of funds committed by the Japanese Government?

A. The Prime Minister of Japan provided $4.8 million to NSF to send American researchers to Japan. We estimate that we will be able to send between 75 and 100 researchers to Japan with this money. In addition, 50 fellowships are available from the Science and Technology Agency (35 via NSF and NIH, and 15 by direct invitation). An additional 50 fellowships are available from the Japan Society for

the Promotion of Science (30 via NSF and NIH, and 20 via direct invitation) with funding from the Ministry of Education, Science and Culture. The value of these 100 fellowships is approximately $4.7 million.

b. Q. Could you also provide a breakdown of how many of the more than 11,000 scientists and engineers cited in your testimony as involved in exchange visits during the last 27 years were American, and what the trend line for those visits shows about the balance of these visits between the two countries?

A. The 11,000 number I gave in my testimony were persons per fiscal year. Because cooperative research awards are for two years, this gave an inflated number of people involved in research projects. The total number of people involved in cooperative research projects was 4,505. The number of Americans was 2,275, and the number of Japanese 2,230. If you count Joint Seminars funded under the Program, 4,112 Americans have visited Japan under its auspices, compared to 5,113 Japanese who came to the United States.

For the last 3 years, the number of Americans visiting Japan for research has been increasing: 51 in 1984; 52 in 1985; and 61 in 1986.

5. Dr. Christopher Hill presented a series of programmatic options for Federal Government action to access foreign scientific and technical information in a recent report. A copy of the report is enclosed.

Please assess the options in terms of cost-effectiveness and compatibility with your ongoing efforts to access foreign scientific and technical information.

A. Dr. Hill's options are commented upon below. The rating for cost-effectiveness and compatibility is on a scale of 1-5, with 5 the best.

- Subscription to 10,000 Japanese technical journals

Cost --- 1
Compatibility - 2

Until we have people who can peruse them effectively throughout the U.S. R&D community, this will not be very cost-effective.

- Translation of 10,000 Japanese technical journals into English.

Cost --- 1
Compatibility - 3

Agree with CRS analysis.

- Subsidy of short-term travel to Japan by scientists and engineers.

Cost --- 4
Compatibility - 5

Rigorous peer review to assure that visits are focussed in areas where required. The number is high. With proper focus on dissemination to relevant communities on return, half this number should be O.K. for some years.

- Comprehensive journal of technical trip reports.

Cost --- 4-5
Compatibility - 5

The key question on cost-effectiveness will be whether or not there is a market. Editorial selection will likely be the measure of success: which trips to report, and how to present the results to the R&D community.

- Graduate fellowships for study of Japanese and science or engineering.

Cost --- 5
Compatibility - 5

This is an important long-term investment. Cost estimates for U.S.-based training are high, since Japanese language training will be part-time. A year in Japan for language training is not likely to be feasible for S&T students. Cost estimate given might fund a modest program. However, if the training course development is successful, this could come as part of a research stay, before starting work in the Japanese laboratory.

- Research fellowships for study in Japan.

Cost --- 5
Compatibility - 5

Right on target. Cost-effectiveness depends in part on post-visit contributions of returnees via

reports/presentations, as well as on good selection criteria for projects, provided by peer review.

- Maintenance of a permanent science and engineering mission in Japan.

Cost --- 3
Compatibility - 5

For the most part, coverage of technical fields can best be accomplished by visitors, whose work is facilitated and informed by staff based in Japan. With the exception of mission agencies like DOD, NASA, and DOE, the fields of import should be determined by the S&T community. Staff based in Japan should be directed to 1) early warning/overview activities, especially highlighting changes, and 2) making technical visits effective.

- Subsidy of translation/abstracting/dissemination journals.

Cost --- 2-4
Compatibility - 5

This type of program should be short-term (3-5 years) and probably smaller. The money to societies should be in some large measure devoted to efforts by the society to cast off among its members the "not invented here" syndrome, as well as to the journal work. Subsidies to commercial firms should be limited to some small percentage of operating costs with a sliding scale reducing the amount each year as the market appears or does not appear.

- Tax incentives for corporate access activities.

Cost --- ??
Compatibility - 4-5

I am not able to judge the effectiveness in general of tax incentives. If they are given, however, I would limit them to medium and small firms. Big firms will do it whether or not there is a tax break. Small firms need an incentive to enter the game.

- Federal awareness, education, and training programs.

  Cost --- 2
  Compatibility - 3

  Best done by professional societies with Federal subsidies. (see above)

- Sponsorship of research on machine-aided translation.

  Cost --- 2
  Compatibility - 2

  Lots of money in this already. Maybe 1/2 to 1/4 this additional amount.

- Extension of the JTECH program to a range of key fields.

  Cost --- 1-2
  Compatibility - 4

  This is a relatively expensive program. Before going into such a commitment, a structured evaluation of JTECH should be carried out to see whether and how the reports have affected those in the U.S. R&D community. The previously proposed technical trips and their reporting will likely be more cost-effective. If we keep up-to-date and informed on what is going on in Japanese labs, we will not need assessments of "behind/ahead/even". We will know.

The National Science Foundation (NSF) is endeavoring to increase the number of American *scientists* and *engineers* who do research in Japan. NSF can provide the following assistance:

- Support for three- to fifteen-month research stays in Japan
- Selection of U.S. candidates for one-year post-doctoral research fellowships to be funded by the Japanese government
- Facilitation of access to Japanese National Laboratories, other projects, including the Fifth-Generation Computer project, and industrial laboratories

In addition, NSF can provide support for Japanese language study aimed at facilitating a researcher's stay in Japan or developing the ability to read Japanese technical literature.

For further details on these programs, see our separate brochures, or contact C. T. Owens or C. W. Wallace at the following address by letter, phone, or electronic mail:

Division of International Programs
National Science Foundation
1800 G Street, N.W.
Washington, D.C. 20550

Tel: (202) 357-9632 or 357-9558
Electronic mail: towens@ note.nsf.gov or
cwallace@ note.nsf.gov

APPENDIX III

ADDITIONAL MATERIALS FOR THE RECORD

S+T

THE SECRETARY OF COMMERCE
Washington, D.C. 20230

APR 6 1988

Honorable James Wright, Jr.
Speaker of the House of
Representatives
Washington, D.C. 20515

APR 08 1988

Dear Mr. Speaker:

Enclosed for your review is a report on Federal Government activities to obtain, translate, abstract, and disseminate Japanese technical literature. It was prepared by staff of the Department's recently established Office of Japanese Technical Literature pursuant to the requirements of Public Law 99-382, the Japanese Technical Literature Act of 1986.

The report summarizes numerous agency and departmental efforts to monitor Japanese science and technology through literature acquisition carried out independently or in conjunction with scientific exchange. U.S. Government programs maintained in Japan are also highlighted. We plan to make the report publicly available through the National Technical Information Service, as it should be of value to industry in calling attention to currently available Federal resources for information on Japanese science and technology. We look forward to using it as a basis for continued dialogue with Congress on this important issue.

Sincerely,

C. William Verity

Secretary of Commerce

Enclosure

REPORT TO CONGRESS ON THE ACTIVITIES OF THE FEDERAL GOVERNMENT TO COLLECT, ABSTRACT, TRANSLATE, AND DISTRIBUTE DECLASSIFIED JAPANESE SCIENTIFIC AND TECHNICAL INFORMATION

C. WILLIAM VERITY, SECRETARY OF COMMERCE

ROBERT ORTNER, UNDER SECRETARY OF COMMERCE
FOR ECONOMIC AFFAIRS

BARRY C. BERINGER, ASSOCIATE UNDER SECRETARY OF COMMERCE
FOR ECONOMIC AFFAIRS

SABINA G. JAVITS, OFFICE OF JAPANESE TECHNICAL LITERATURE

TAMAMI KUSUDA, OFFICE OF JAPANESE TECHNICAL LITERATURE

INTRODUCTION

This report on the activities of the Federal government to acquire, abstract, translate, and disseminate Japanese technical literature has been prepared in accordance with the requirements of Public Law 99-382, the Japanese Technical Literature Act of 1986. It was written by staff of the Office of Japanese Technical Literature, which was formally established in the U.S. Department of Commerce in June, 1987. The office is staffed by two Japanese-speaking professionals under the direction of Associate Under Secretary for Economic Affairs Barry Beringer.

Since the office was established several tasks have been completed which meet the Japanese Technical Literature Act's objectives to increase the availability of Japanese scientific and technical literature in the United States. The Act specifies numerous activities aimed toward achieving this objective including: publication of an annual directory of resources in the United States which translate, abstract, and disseminate Japanese technical literature, and preparation of annual reports summarizing important high technology developments in Japan. The Act further stipulates that the Department work with businesses and professional societies to

meet their needs for Japanese technical literature and coordinate Federal government activities in order to avoid duplication of effort.

In December 1987 the National Technical Information Service assisted by the Japanese Technical Information Research Service of George Mason Institute published the first annual "Directory of Japanese Technical Resources." This directory lists public and private sector services which obtain, translate, abstract,and disseminate Japanese scientific and technical literature. A listing of all translations of Japanese language material performed by the Federal government in the last year and case studies of successful U.S. company efforts to obtain and utilize Japanese technical literature are also included. Members of the public can purchase the directory from the National Technical Information Service for $36.00.

Two reports summarizing the current status of Japanese research and development efforts in key high technology fields have been prepared. The first, on advanced ceramics, has been published and is available through the National Technical Information Service. It was written by Dr. Robert Gottschall of the U.S. Department of Energy based on extensive examination and review of Japanese laboratories engaged in advanced ceramics R&D. The second report on flexible manufacturing systems (FMS) is being

conducted by Dr. Bruce Rubinger of the Global Competitiveness Council, and is expected to be published in early 1988. In addition to these reports, the Office of Japanese Technical Literature is a sponsor of Phase 3 of the Japan Technology Evaluation Program (JTECH) led by the National Science Foundation and its contractor Science Applications International Corporation.

In order to better assess and evaluate industry demand for Japanese technical literature the Office has sponsored a survey of current needs for Japanese information in the field of advanced ceramics. Mr. Justin Bloom of Technology International, Inc. is conducting the survey - the final results of which are expected by March 1988. Several professional societies including the American Ceramics Society and the United States Advanced Ceramics Association are actively involved in this effort.

In cooperation with the Office of Naval Research (ONR), and other government agencies the Office of Japanese Technical Literature plans to sponsor a series of industry workshops on important high technology developments in Japan in Fall, 1988. A similar workshop for government employees is scheduled for April 22, 1988 at National Defense University. The office has also initiated an inter-agency meeting on Federal government

access, use, and distribution of Japanese technical literature for March 1988 at the Department of Commerce. This will be the first of a series of quarterly meetings intended to develop better coordination of Federal government activities, although a preliminary inter-agency conference on this issue was held at the National Technical Information Service in April of 1987 prior to formal establishment of the Office of Japanese Technical Literature.

This report was prepared on the basis of extensive correspondence, meetings, and communication with Federal agency and department officials involved in the acquisition, use, and/or dissemination of Japanese scientific and technical literature. The Office of Japanese Technical Literature looks forward to using this report as a basis for working with other Federal agencies to coordinate related activities, and as the foundation for continued dialogue with Congress on activities carried out under Public Law 99-382. All of the programs and activities listed are continually evolving and the report will be updated annually.

The information is listed alphabetically under Executive Departments, Independent Agencies, and Quasi-Governmental Agencies.

EXECUTIVE SUMMARY

This report confirms the existence of significant activity within various departments and agencies of the Federal government to acquire, translate, and disseminate Japanese technical literature. The extent and range of these efforts vary greatly with the most activity in open source literature acquisition taking place within the Department of Commerce, the Department of Energy and the National Aeronautics and Space Administration (NASA).

With the exception of the National Technical Information Service (NTIS) and other government entities such as the Foreign Broadcast Information Service which exist solely for the purpose of obtaining and disseminating information, most agencies acquire Japanese literature within a limited subject range determined by their individual needs. Usually the literature is obtained on an ad hoc basis through scientific exchange agreements with counterpart government entities in Japan, or through specific information exchange agreements.

Almost all the agencies included in this report have a number of bilateral science and technology agreements with Japan which cover clearly defined topics of mutual concern to Japan and the United States. Literature exchange is usually only an adjunct

of these agreements, although some agencies such as the Department of Energy and the Nuclear Regulatory Commission (NRC) maintain agreements specifically for information exchange. Feedback indicates that the volume of literature received under these agreements is sufficient, and in some cases too large to evaluate or utilize effectively. Few agencies have Japanese language proficient staff or other means of screening incoming material, and in most cases, government researchers are so overwhelmed with publications that Japanese information is automatically assigned low priority.

Lack of screening and evaluating procedures when combined with an absence of long-term objectives for acquiring Japanese technical literature can create fragmentation, duplication of effort, and over-reliance on the Japanese to supply the appropriate information. These factors can also inhibit inter-agency coordination, since with the exception of NASA, DOE, and NTIS, few agencies have established programs for acquiring Japanese technical literature which would provide a framework for consistent communication.

The Federal government and the country as a whole are at a relatively early stage in seeking information outside U.S. borders. As U.S. researchers increase their awareness of Japanese scientific and technical developments, internal

demands for useful and timely information from Japan can be expected to grow. This report will hopefully serve as the basis for future enhanced efforts at the Federal level.

EXECUTIVE DEPARTMENTS

DEPARTMENT OF COMMERCE

National Technical Information Service

The National Technical Information Service (NTIS) is the central source for the public sale of research, development, and engineering reports and other analysis prepared by federal agencies. It is also the main source for federally-generated data files and information on new U.S. government owned patents and patent applications. All NTIS documents are available to the public for a fee as NTIS is required by law to be self-supporting.

Foreign scientific and technical documents are made available through the NTIS Foreign Technology Acquisition Division established in 1979. The objectives of this program are to identify industry needs for technical information, and obtain and distribute important foreign language materials through cooperative arrangements with organizations overseas which handle the sale of NTIS documents. In Japan, NTIS has an agreement with Mitsubishi Research Institute which employs one individual to identify sources of relevant technical reports. Most of these are obtained through acquisition agreements with over forty Japanese organizations including the Science and Technology

Agency and the Agency of Industrial Science and Technology. (See Appendix 1 for completed listing.) An additional source for Japanese documents are other U.S. government agencies such as the Department of Energy and NASA, which obtain information through their Japanese counterparts.

In fiscal year 1987 NTIS acquired roughly 1300 documents of Japanese origin, which represents about 7 percent of the entire NTIS foreign document collection. Average sale of non-subscription Japanese documents in 1987 was approximately 2 copies per title compared with approximately 1 copy per title of all foreign documents in the NTIS collection.[1/]

In addition to its printed report collection, NTIS provides access to the Japan Information Center of Science and Technology (JICST) on-line data base, through a cooperative arrangement with George Mason University (GMU). Under the terms of the agreement, NTIS provides GMU with direct on-line access from the U.S. to the nine databases in the JICST On-line Information Service (JOIS). Eight of the nine are in Japanese and can be accessed only through the use of Japanese terminal equipment. One is in English and contains about 400,000 titles of Japanese papers and

reports on science, technology and medicine. In return for access to these databases, GMU personnel provide NTIS with expert assistance in searching the JICST data base. NTIS recovers the costs by adding 10-15% (depending on the type of user) to the fees charged users of the system. Current charges for JICST searches through NTIS are $89.57 per hour for private sector users and $93.64 per hour for government users.

patalert:

NTIS is developing a family of patent abstract newsletters to be called "PATALERT" utilizing abstracts of Japanese patent applications filed by Japanese nationals in the Japanese Government Patent Office. Another Japanese government entity, JAPIO (Japan Patent Information Agency) publishes English translations of these abstracts done by a private firm in Tokyo.

Negotiations are underway to obtain copyright clearances for the abstracts. It is hoped that under the PATALERT plan, the more important applications will be identified, classified into a discrete number of scientific technical categories, and condensed into a "browsing" format for scientists and engineers. NTIS is considering a survey to determine if a market exists for this type of service.

translations consortium:

NTIS has initiated the formation of a translations consortium to facilitate the translation of Japanese scientific and technical information into English. The intent of the consortium is to combine the resources of NTIS, the National Translations Center, and private sector members to provide cost-sharing of translations and avoid duplication of effort. A file of translations in progress will be maintained, and members of the Japan Interest Group of the American Translators Association can be listed if they wish. These files will facilitate avoidance of duplication of effort and allow matching between specific documents and translators with the appropriate technical knowledge. Members will be able to announce the availability of a document in translation and invite others to share in the cost. The organization holding the document can request anonymity for proprietary reasons. As of February 1988, NTIS held two meetings attended by representatives of government agencies and departments, professional societies, and private industry. At each of these meetings, concerns over copyright issues dominated the agenda.

Japanese auto standards:

At the request of the Michigan Chamber of Commerce and the automobile parts manufacturing industry, NTIS has begun a program to translate Japanese auto parts standards into English and make them available to U.S. firms competing for Japanese auto parts contracts. Many of these standards present a barrier to U.S. engineers because unknown Japanese symbols and nomenclature are used. NTIS has held an organizational meeting of interested government and industry representatives and has begun collection of available data on relevant U.S. standards.

National translation center:

NTIS is the U.S. member of the Government Board of the International Translation Center (ITC) in the Netherlands. The ITC is a cooperative organization with memberships in most European countries. A government agency of each member nation represents that nation on the Board. The U.S. National Translations Center (NTC) which NTIS sponsors

on the ITC is located at the John Crerar Library in the University of Chicago.

The Center functions as a repository for both Federal government and private industry sponsored translations of foreign language material. The NTC library holds nearly one million English translations of a variety of foreign language documents which consist mainly of journal articles, conference papers, and patents.[1/] Users can search the NTC holdings by subject for appropriate translations, and organizations contemplating translating a document can query the NTC first to determine whether such a translation has already been done in order to avoid duplication of effort. Last year the NTC acquired nearly 200 translations of Japanese origin performed by the Federal government, which are listed in the 1987 "Directory of Japanese Technical Resources" which is available from NTIS.

The NTC and ITC are combining their bibliographic databases into the World Translations Index, which recently became available on-line through Dialog. A significant reason for NTIS sponsorship of NTC on the ITC Board is to bolster the NTC role in determining cataloguing and indexing standards for information available through Dialog. NTIS expertise

in this area and its long business association with Dialog facilitated NTC negotiations for its desired standards.

Limited funds prevent the NTC from conducting outreach or other public relations efforts to solicit the contribution of translations. Instead the Center must rely on contributors' initiative and word of mouth advertising. As an incentive, donors are provided with free searches of the database. Hard copy translations are supplied for $20.00 per document.[4/]

Government agencies - the largest sources are NASA, DOD, and DOE - will register translations of material for which copyright clearances have been obtained from the original publisher. Industry donors are also inhibited by copyright concerns as well as fears of revealing proprietary information. As a result, despite the fact that contributor identities are kept confidential, certain donor companies may "hold" translations for several years before forwarding the documents to the NTC. While little can be done to address this proprietary concern, the NTC staff is contemplating the negotiation of copyright clearances with the original publishers of the majority of its translations as a means of encouraging more contributions.[5/]

NTIS registers full translations of foreign documents with the Center. Inevitably there is some overlap, but it is minimal since the NTIS collection is comprised almost entirely of technical reports and the NTC collection contains mostly journal articles. Patent documents are the largest source of duplication.

government cooperation:

A major means of cooperation between NTIS and other government agencies dealing in scientific and technical information is provided through a cooperative effort known as "CENDI." CENDI stands for Commerce, Energy, NASA, and Defense Information. The National Library of Medicine is also a member.

NTIS serves as the public access point for open source technical information from these agencies' technical information centers which generate the vast majority of technical literature. In turn these centers disseminate information about NTIS holdings within their own communities. CENDI was created as a result of the need for consistent coordination amongst the four agencies.

barriers to acquisition of information:

Above and beyond the language problems inherent in identifying and translating Japanese technical literature, copyright problems have presented a difficult obstacle to NTIS in its efforts to acquire Japanese publications. All published material in Japan - including government publications - is considered copyrighted regardless of whether it carries a copyrighted statement, and permission to reproduce this material is obtainable only after a lengthy approval process involving multiple layers of authority.

This difficulty was alleviated to a large extent when NTIS established its cooperative arrangement with Mitsubishi Research Institute. Its agent was able to assist in negotiating blanket copyright releases with the forty-odd organizations with whom NTIS has acquisition agreements.

However, copyright issues are still a barrier when NTIS wishes to obtain published material from a Japanese entity not covered under an acquisition agreement.

Another barrier is the lack of a centralized clearinghouse in Japan for its own technical literature - including an assessment of what is available though Japan's countless research organizations. The NTIS counterpart in Japan - Japan Information Center for Science and Technology only began collecting technical reports from the Japanese Government a few years ago, and the collection in still somewhat limited.6/

A forum to address these and other issues related to the acquisition of Japanese scientific and technical information on a government-to-government basis, may be provided through renewal of the pending US-Japan non-energy agreement. The current version of this executive umbrella agreement covering various aspects of scientific cooperation expires on March 31, 1988. The Department of State is the lead agency in re-negotiating the U.S. side of the agreement which contains material jointly developed by the White House Office of Science and Technology Policy, the National Science Foundation, and the Departments of Commerce and State. As currently drafted, the agreement requires the establishment of a Scientific and Technical

Information Committee comprised of the heads of U.S. and Japanese government organizations and other entities directly concerned with access to information on Japanese science and technology. Copyright issues could be addressed in the forum provided by this committee, but as of January 15, 1988 the Japanese had not signed off on this or any other major portion of the agreement.

Patent and Trademark Office

The Patent and Trademark Office (PTO) is automating its applications processing and information storage functions, and maintains holdings of Japanese technical literature in both paper and electronic forms. In printed form, the PTO carries English language abstracts of Japanese patent documents obtained from the Japanese Patent Information Organization (JAPIO), the patent information dissemination arm of the Japanese government. On roughly a monthly basis, JAPIO publishes English language abstracts of unexamined Japanese applications in a booklet entitled Patent Abstracts of Japan, which is issued in four separate series (Chemical, Electrical, Physical, and General and Mechanical). This booklet covers only a selected number of technology areas and is limited to those documents that have been filed by Japanese nationals. Appendix 2 lists the range of coverage for the last three years.

The other major source of Japanese abstracts in printed form is Derwent Publications, Ltd. The majority of the abstracts provided by Derwent focus on the chemical arts, although there is some overlap between the abstracts provided by Derwent and JAPIO. In 1986, Derwent provided abstracts of over 83,000 unexamined Japanese applications and 15,500 patents to the PTO.[7/]

Because Patent Abstracts of Japan is copyrighted, copies cannot be made without JAPIO's consent. Members of the public are limited to viewing these and the Derwent abstracts in the PTO search rooms and depository libraries.

Besides the printed abstracts, PTO has about 85,000 English translations of Japanese patent abstracts dating back to 1980 in electronic form. However, these will not be available for use until they are incorporated into the Automated Patent Search System (APS) currently under development by PTO. When the system is completed, the abstracts will be searchable using the APS full text search capability.

The PTO deals primarily with its counterpart, the Japanese Patent Office, in all efforts related to the acquisition of Japanese patent literature. Agreements with the JPO are maintained which encompass the English language translations of

Japanese patent abstracts. Under the terms of a trilateral agreement between PTO, JPO, and the European Patent Office (EPO), the PTO reimburses the JPO for the marginal costs associated with duplications of electronic data, and pays all shipping costs directly to the shipping agent of its choice.

The trilateral conferences among the three regional entities have produced several studies, one of which is the explanation of the potential use of machine aided technology to translate Japanese patent literature into English. No significant findings have as yet resulted from these studies. The PTO is a potential user of the machine translation system being developed by the Air Force and the Intelligence Community. (See Appendix 5 on "machine translation.")

The PTO has no formal programs in place for coordination with other Federal agencies on the acquisition, translation and dissemination of Japanese patent information in printed or electronic form. Most interaction with other Federal agencies takes place through the PTO Foreign Patents Division, where inter library loan requests for full-text Japanese patents are processed. The bulk of these requests are from the Departments of Energy, Agriculture, and the U.S. Navy at a total rate of about 100 annually.[8/]

The PTO has one full-time Japanese language proficient staff member employed as a translator.

National Bureau of Standards (NBS)

printed literature:

The National Bureau of Standards acquires technical information from Japan in literature form through journal subscription, and more directly through several active programs for joint scientific exchange. Printed information is available through the NBS library which subscribes to 49 English language serials covering a variety of technical topics. Most are regularly published journals or bulletins, although there are also a few collections of abstracts.

UJNR panels:

Exchange of scientific personnel and information is conducted with the Japanese through NBS participation on the U.S. - Japan Natural Resources panels on wind and

seismic effects, and fire research and safety. The panel on Wind and Seismic Effects was created in 1978. Joint panel meetings are held every two years in alternating locations between the United States and Japan. The panel is composed of 15 U.S. agencies and 6 Japanese agencies co-chaired by NBS and the Public Works Research Institute.Since the panel was established, over 25 workshops and conferences have been held resulting in the publication of about 25 joint research papers and nearly 1,000 technical papers in both countries. Approximately 100 researchers and engineers from each country have participated in joint programs and investigations in counterpart laboratories.

The panel on Fire Research and Safety was established in 1975-1976 to exchange technical information and research results on mutual areas of concern. NBS is the sole U.S. government participant. On the Japanese side, seven government agencies are involved. Since 1981 there have been nine staff exchanges, with three U.S. scientists working in Japanese laboratories and six Japanese scientists working in the NBS Center for Fire Research.

NTT

agreement:

In 1984 NBS signed an agreement with Nippon Telephone and Telegraph (NTT) laboratories in Japan. The agreement, which extends until 1989, provides for the exchange of information and personnel in mutually agreeable technical areas. Thus far one NTT researcher has spent several months at the NBS laboratories in Boulder, Colorado, and one NBS researcher spent an equivalent amount of time at the NTT facilities in Tokyo.

NBS regards the potential value and impact of this agreement quite highly, as it provides access to scientific developments in NTT faster than obtainable through normal industry channels. NBS shares the information gained through the agreement with industry in an effort to enhance U.S. companies' ability to compete with their Japanese counterparts in selling telecommunications equipment to NTT.[9/]

the office of standards code and information (osci):

The NBS Office of Standards Code and Information (OSCI) carries out several activities in support of the requirements of the Agreement on Technical Barriers to Trade (popularly known as the Standards Code) of the General Agreement on Tariffs and Trade (GATT) implemented in the U.S. Trade Agreements Act of 1979. As specified by the Act, the OSCI operates as the U.S. GATT "inquiry point" for standards and certification matters, maintains a national repository of standards and certification information, and provides a technical assistance office to investigate problems relating to non-tariff trade barriers.

the national center for standards and certification information:

The National Center for Standards and Certification Information (NCSCI) functions as the central repository for information on U.S. and foreign standards. NCSCI provides access to a computerized database of information on over 30,000 U.S. voluntary standards published by U.S.

professional and technical organizations, Federal and state government groups, and foreign national and international organizations. The NCSCI collection includes more than 300 standards-related reference books such as directories, technical and scientific dictionaries, encyclopedias and handbooks, periodicals , newsletters, articles, and reports. Copies of proposed Japanese technical regulations as conveyed to the GATT and other Japanese standards-related publications are available in both Japanese and English.[10/]

National Oceanic and Atmospheric Administration (NOAA)

NOAA has two bilateral scientific and technical agreements with Japan which provide for the exchange of information, including literature, on a quid pro quo basis. The first, in marine sciences, resulted in the establishment of the Marine Resources and Engineering Coordinating Committee of the US-Japan Natural Resources Program. Under this program, twelve marine and seven non-marine panels of Japanese and American participants meet every two years to discuss areas of mutual interest and concern. The agreement also provides for scientific exchange between the U.S. and Japan on various marine-science related projects which may result in the publication of joint research.

Printed literature usually in the form of individual technical journal articles is provided by NOAA's Japanese government counterparts under the terms of the agreement. Some of the articles are written in English while others have English abstracts only. While the printed information provided through the agreement is useful, the coverage is inevitably spotty. Ideally, NOAA would like to have the important Japanese marine science journals translated on a regular basis as a means of monitoring research trends in Japan in a consistent manner.[11/]

Under the current system, articles of interest written in Japanese are contracted out for translation through the NOAA Language Services Branch, International Affairs. This branch used to have full time Japanese translators on staff, but limited funds now restrict in-house translating capability to one part-time student translator.[12/]

The Language Services Branch found that the most cost effective means of keeping abreast of Japanese marine-related developments was to donate money to the U.S. Embassy staff in Tokyo to scan fisheries reports and other important marine-related publications. Information gleaned from these reports is disseminated to NOAA staff and some relevant

industry representatives in weekly international fisheries reports. Japanese fisheries information is also disseminated via a bimonthly publication titled "Survey of Foreign Fisheries: Translated Tables of Contents and New Translations." Occasionally, and if funds permit, the Language Services Branch contracts out full translations of Japanese and other foreign books. If the book is published, a copy is sent to NTIS.

In addition to the marine science agreement, NOAA maintains an agreement with Japan on space and weather issues administered by the National Environment Satellite Data and Information Service (NESDIS). NESDIS receives space-related journal articles and other technical information from Japan through the National Space Development Agency of Japan (NASDA) and the Japan Meteorogical Agency. These articles are provided on an ad hoc basis according to mutual areas of interest in both English and Japanese. NOAA staff believe the information provided to be appropriate and useful.[13/]

International Trade Administration (ITA)

support of
AEA office:

Over the past three years, ITA, through the Office of Trade Adjustment Assistance, has allocated substantial grant support to the American Electronics Association (AEA) Office in Tokyo. Manned by four full-time staff, the AEA office was established to help open the Japan electronics market to U.S. firms through organization and support of American industry groups in Japan, administration of a fellowship program to place U.S. science/engineering students in Japanese corporate labs, liaison with the Japanese Diet, publication of a monthly newsletter, and numerous other activities. The office has been very successful in promoting the interests of the U.S. electronics industry in Japan.

itech:

In 1983, ITA with the support of NSF, initiated the Japanese Technology Evaluation Program (JTECH) to provide definitive technical assessments of emerging Japanese

trends in selected high technology areas. The initial program focused on four technical areas - computer science, mechatronics, opto and microelectronics, and biotechnology. The program objectives were to: 1) develop appropriate assessment methodology; 2) evaluate sources of Japanese scientific and technical information; and 3) provide technical assessments as references for staying abreast of Japanese developments. The technical assessments were made by panels of U.S. experts drawn from business, government, and academia. Each panel produced a report analyzing the current status and long-term forecast of Japanese research and development efforts.

Under Phase I of the program led by ITA and NSF, four reports in the key technical areas identified above were produced between December 1984 and August 1985. Under Phase II of the program, supported by the Defense Advanced Research Projects Agency (DARPA) and the NSF two reports on telecommunications and advanced materials were published. Phase III, again under the direction of DARPA and NSF is in the initial stages of implementation. The Office of Japanese Technical Literature is providing some funding support for Phase III. Candidate technology areas for study are semiconductor manufacturing, optical and magnetic memories,

nuclear power generation, space commercialization, and sensors. Science Applications International Corporation is the contractor.

JTECH reports have been relatively well distributed in the business and research communities, and summaries have appeared in trade press and professional journals. Feedback from a user survey conducted in April of 1987 indicated that the reports were comprehensive but sufficiently non-technical to have appeal to policymakers and industry strategists as well as scientists.[14/] No more recent survey has been conducted, but in general JTECH reports continue to be quite useful in interpreting broad policy trends, especially when published in a timely manner. The lengthy review and editorial process tends to create significant delays in publication. All published JTECH reports (see Appendix 3 for listing) are available through the National Technical Information Service.

biotechnology

report:

In 1985, the Biotechnology Program of the International Trade Administration and the United States and Foreign Commercial Service (US & FCS) initiated a study on

biotechnology activities and policies in Japan. This study was conducted as part of an experimental project to assess the level of science and technology and research and development policies in Western Europe and the Far East. For the Japan study, a senior scientist with knowledge of the Japanese language and extensive contacts in Japan was posted at the U.S. Embassy in Tokyo from September 1985 to October 1986. Before leaving for Japan, the scientist conducted an assessment of biotechnology activities in the United States through visits with over thirty U.S. companies engaged in biotechnology research and development. In Japan, the scientist conducted interviews with approximately 500 Japanese officials knowledgeable in biotechnology including bench scientists, government personnel, private company administrators, R&D program managers, and production plant managers. The results of these interviews were compiled and analyzed into a detailed assessment of Japanese research and development activities on biotechnology in both government and industry.[15/] A lengthy review and editorial process has delayed publication until approximately mid 1988.

33

DEPARTMENT OF DEFENSE

Defense Advanced Research Project Agency (DARPA)

DARPA has been a major source of funding for the Japan Technology Evaluation Program (JTECH) since the initiation of Phase II of the program when its initial sponsor, the Department of Commerce's International Trade Administration, withdrew. Other than JTECH, DARPA administers or contributes to no regular programs for the acquisition of Japanese technical literature. Occasionally the agency may send researchers in the computer science field to Japan for short term visits.[16/]

Air Force Foreign Technology Division

The Department of Defense houses a collection of foreign science and technology information primarily for the use of the Air Force at the Foreign Technology Division (FTD) facilities located at Wright-Patterson Air Force Base. A database of classified material is maintained for the use of DOD and DOD contractor personnel, with public access restricted. Material in the collection tends to reflect the analysis needs of DOD at any given time. Currently it is dominated (80-85%) by information relating to the Soviet Union.[17/]

The FTD is engaged in primary acquisition of some Japanese periodicals and is a subscriber to the Japanese Technical Information Service operated by University Microfilms Inc. From time to time the FTD may contract out a full translation of a Japanese journal article or other document. Copies of translations are sent to the Defense Technical Information Center (DTIC) - a repository for defense-related technical information located in Washington. Very few Japanese reports or translations are sent to NTIS due to copyright and security concerns.

Since the 1950s the FTD has been actively involved in the development and use of machine translation technologies. Currently it is developing Japanese-English and English-Japanese systems through a contractor in conjunction with the Intelligence Community. A more detailed description of this project is contained in Appendix 5.

Army Foreign Science and Technology Center

This center, located in Charlottesville, Virginia, is a subordinate to the Army Intelligence Agency established to keep abreast of foreign developments in military materiel and hardware. The Center's Document Analysis Branch collects

documents on specific topics from a variety of sources world-wide, and disseminates them to the Army intelligence agencies and other members of the intelligence community. The Document Analysis Branch also contracts for translations of foreign language material, including Japanese. All translations are sent to the Defense Technical Information Center (DTIC),[18/] which in turn may forward the documents to NTIS if no copyright or security concerns exist.

Office of Naval Research

The Office of Naval Research (ONR) operates a Far East Science Liaison Office in Tokyo on a cooperative basis with the Air Force and Army. The office is staffed by seven U.S. professionals (3 Navy, 3 Army, and 1 Air Force), three Japanese specialists, and three administrative, for a total of fifteen positions. The purpose of the Office is to support the research and development activities of the three services in all matters of scientific interest in the Far East by identifying, analyzing, and reporting significant trends and developments in Far East scientific research.

To fulfill its mission, the office recruits U.S. scientists with distinguished research records in current fields of interest to the office. They are usually recruited to serve

one to two year terms. These researchers make contacts and visit research labs in Japan on a scientist to scientist basis in order to assess first hand, important scientific and technical developments taking place. The ONR office also makes use of visiting U.S. academics to supplement the coverage of scientific activities provided by the regular staff.

The office publishes a quarterly journal called Scientific Bulletin which is highly valued and appreciated in U.S. technical communities. Currently it has a distribution list of approximately 7,000 in the business and academic/research communities.[19/]

DEPARTMENT OF ENERGY

Office of Scientific and Technical Information

The Department of Energy began a formal program for the acquisition of foreign source, energy-related technical information in the 1950's through its predecessor the U.S. Atomic Energy Commission, when the Office of Scientific and Technical Information (OSTI) was established in Oak Ridge, Tennessee. OSTI serves as the agency's central repository for information exchange within the DOE community and its contractor family. Energy-related information from Japan is

obtained under the auspices of several multilateral exchange agreements. The Energy Technology Data Exchange (ETDE) established by the International Energy Agency in January 1987, is the most recent. The Japan Atomic Energy Research Institute (JAERI) and the New Energy Development Organization (NEDO) both of which are operated by the Ministry of International Trade and Industry, provide Japanese energy-related technical information to the ETDE.

Through the ETDE agreement, summary descriptions of energy-related research are exchanged on magnetic tape for immediate input into the OSTI Energy Data Base. The database is available on line to the public through DIALOG Information Services and STN International. Hard copies of non-copyrighted, government sponsored translations of Japanese and other foreign language material are forwarded to NTIS for public distribution. Along with NASA, DOE is the largest source for Japanese to English translations listed in the 1987 "Directory of Japanese Technical Resources."

Japanese items in the Energy Database are acquired from journals, books, patents, conference papers, and reports. Over 1,000 Japanese journals obtained from approximately 1500 corporate, university, and government research entities in Japan are represented. Japanese material is obtained by OSTI

directly from these sources under the auspices of the Energy Technology Data Exchange or indirectly through various Department of Energy offices and contractor labs. Last year OSTI obtained over 10,000 items from Japan, and this amount is expected to grow in succeeding years as the Energy Technology Data Exchange evolves from the startup phase into full implementation.[20/]

bilateral agreements:

Much of the Japan-related information generated internally within the Department is obtained through a network of bilateral scientific and technical agreements which DOE maintains with its Japanese counterparts. The Department currently has fourteen of these agreements covering a variety of technical fields including: high energy physics, electrical field research, coal technology development, fusion (3), nuclear waste management (2), other nuclear (3), and renewable energy (2). A general agreement designed to promote wider cooperation in energy research and development is also maintained. The agreements provide for the operation of joint research projects involving the exchange of personnel, equipment, and funds between American and Japanese facilities. Joint

publications authored by U.S. and Japanese scientists often result.[21/]

DOE maintains a representative at the U.S. Embassy facilities in Tokyo who facilitates visits by DOE-sponsored scientists to Japanese research institutions. This representative maintains and develops useful contacts and sources for technical information in Japan, and channels this information to the appropriate DOE offices in the United States.

nuclear bilateral activities:

DOE nuclear programs dominate the agency's bilateral exchange with Japan. For example, the Department initiated significant activities related to cooperation with Japan on nuclear fusion activities in the late 1970s following approval of several fusion-related bilateral agreements. In addition to joint projects undertaken with Japanese government and university fusion research centers, the Department carries out joint planning and operates a Joint Institute of Fusion Theory with its Japanese counterparts.

These activities result in the exchange of technical reports on an informal basis. Important material in Japanese may be translated through a contractor and sent to OSTI and NTIS, assuming there are security or copyright concerns.[22/]

Office of Conservation - International Research Monitoring

In Fiscal Year 1986, the DOE Office of Conservation initiated an International Research Monitoring (IRM) program to track foreign energy conservation-related research and assess the importance of this information to U.S. energy conservation research. Under the direction of DOE contractor Pacific Northwest Laboratory operated by Battelle Research Institute, the IRM program produced a sourcebook on conservation-related research in Japan in July, 1987. The sourcebook contains information on national objectives, key organizations and programs, funding levels, and specific technology areas.

Other planned IRM activities which may include Japan are technology assessments to obtain data and information on foreign R&D, and enhancement of information sources including regular scanning and dissemination of currently available technical material. The IRM staff will also assess DOE's conservation and renewable bilateral agreements with Japan.

study and compare European and Japanese R&D expenditures, and study and compare European and Japanese approaches to joint R&D ventures.[23/]

DEPARTMENT OF HEALTH AND HUMAN SERVICES (HHS)

National Library of Medicine

HHS maintains several bilateral science and technology agreements with Japan which provide for joint research and information exchange on specific health-related topics such as cancer, AIDS, and gerontology. The acquisition of Japanese literature is carried out by the National Library of Medicine, which serves as the U.S. repository for biomedical publications from around the world. Through a computerized system known as MEDLARS (Medical Literature Analysis and Retrieval System), the library can access approximately 10 million references to journal articles in the health sciences obtained from domestic and foreign sources, including Japan. Japanese references with English titles and abstracts are obtained from the Japan Information Center for Science and Technology (JICST). Ideally the library would like to gain unfettered access to all biomedical science databases in Japan in order to obtain non-selective and comprehensive coverage.

In addition to the material made available through JICST, the NLM engages in the primary acquisition of major Japanese biomedical journals published in both Japanese and English. Approximately 2,000 journals of Japanese origin are contained in the collection.[24/]

DEPARTMENT OF STATE

Science Counsellor-U.S. Embassy

The Science Counsellor and staff at the U.S. Embassy in Tokyo monitor scientific and technical developments in Japan and funnel printed report material (mainly periodicals) to State Department offices and other government agencies in the U.S. The Counsellor cooperates in this and related activities with NSF staff, whose offices are in the Embassy compound. In addition, the Science Counsellor serves as liaison between visiting U.S. scientists and Japanese research entities.

scientific exchange:

Recently, with the cooperation of the National Science Foundation and other Federal agencies, the State Department initiated a program to house U.S. scientists at U.S.

Embassy-based facilities in Tokyo for short-term periods of research ranging from three to six months. Under the terms of the proposed plan, living facilities may be made available to researchers whose salary and other expenses are covered by a sponsoring agency. As of mid-November, NSF, FDA, and NTIS had submitted specific proposals. A key element to the usefulness of this project will be effective dissemination of the research results in the United States.

INDEPENDENT AGENCIES

Foreign Broadcast Information Service

The Foreign Broadcast Information Service (FBIS) has operated as a service of common concern to U.S. government agencies and departments since 1941. It monitors foreign media and other information sources in the political, economic, technical, and scientific fields in eight geographic regions, selects and translates relevant material, and disseminates it to interested U.S. government departments and agencies.

The bulk of FBIS material garnered from news sources, commentaries, and official speeches and statements, is published in the FBIS Daily Report. Translations from foreign language publications in scientific fields are usually published in serial reports and ad hoc issuances by FBIS' domestic facility, the Joint Publications Research Service (JPRS). JPRS reports are issued on a roughly weekly basis in two versions: an open version containing no copyrighted material which is available to the public through the National Technical Information Service, and a restricted version containing copyrighted material which is distributed only within the U.S. government. Distribution within the government averages 188 copies per report.[25/] The National Technical Information Service estimates that there are currently over 400 subscribers to the unrestricted JPRS reports.[26/] Copies of

most unrestricted JPRS reports are also held in the Library of Congress. A monthly index is prepared by the Micro Photo Division of Bell and Howell.

Material on Japan appears in the Asia/Pacific volume of the FBIS Daily Report and two publications issued by JPRS - one general (Japan Report) and one specifically devoted to science and technology (Japan Report - Science and Technology). The FBIS Daily Reports are also released in two versions: one limited to official use only because of copyright restrictions, and another that is available to the public.

Most of the material in the Daily Report is of high quality in addition to being quite timely - published within days after it is obtained from the original source. The time lag for fully translated material printed in JPRS publications is longer due to the huge volume of material which must be obtained, processed, and distributed for translation. The delay ranges from two weeks to four months in the Japan Report, and from three weeks to ten months in the Japan - Science and Technology report.

Another hindrance to maximum utilization of the FBIS/JPRS material is the lack of a readily available index. Because of the large amounts of material obtained, articles appear more

chronologically that by subject, and to make the most of the reports the user has to sift through the entire document. Finally, FBIS is not equipped to receive feedback from the users of open source JPRS material. Judgments as to which material is worth translating and incorporating into the reports is limited to general collection requirements, making it difficult to respond to the information needs of users. These issues do not however, detract from the inherent quality and usefulness of the FBIS reports which deserve wider distribution than current copyright restrictions permit.

Library of Congress

The Library of Congress has approximately 2500 scientific and technical periodicals from Japan in its collection. Of this total, about 1500 are printed in Japanese, with the remainder available in English and other non-Japanese languages. The bulk of the Japanese periodicals are obtained through gifts and exchanges with Japanese institutions, with the largest source being the Library of Congress' Japanese counterpart, the National Diet Library. The remainder are exchanges or gifts from private companies, major Japanese universities and various scientific and technical institutions such as private research institutes, trade associations, and learned societies. Periodicals are exchanged in 26 subject areas including three areas of engineering technology and four in the basic sciences.

The Library also obtains about 180 scientific and technical journals from Japan through subscription or other means of purchase.[33/] Limited funds prevent the Library from purchasing a more extensive collection of periodical literature and have also resulted in a shortage of personnel available to catalogue the Japanese material. At present one Japanese-proficient staff member is responsible for cataloguing the Library's entire collection of Japanese language periodicals. The addition of a computerized cataloguing system would greatly facilitate this process, and encourage better familiarity and use of the Japanese scientific and technical material.

Almost all of the periodicals have English titles and abstracts, and can be searched in the Library's Japan Section. Journals obtained from Japanese sources that are printed in English are available in the Periodical Reading Room. A directory of all scientific periodicals published in Japan compiled by the National Diet Library every three years is also available in the Japanese section.

National Aeronautics and Space Administration (NASA)

NASA maintains an aerospace database which combines electronic versions of two abstract/index periodicals: the International Aerospace Abstracts (IAA) and Scientific and Technical

Aerospace Reports (STAR). The database has been maintained and operated since 1962 by the American Institute of Aeronautics and Astronautics (AIAA). A portion of the database containing non-classified information is commercially accessible through DIALOG Information Services, Inc. Access by foreign government, organizations, and agents is not allowed without prior written approval of the AIAA.[27/]

Roughly 37% of the database is comprised of foreign source items, with the majority (14%) originating from the USSR and other Soviet Bloc countries.[28/] Japanese items make up about 5% of the database. The bulk of the Japanese items are provided by the National Aerospace Laboratory of the Science and Technology Agency, the National Space Development Agency (NASDA), and universities.

NASA is currently developing an information exchange agreement with Japan's Science and Technology Agency. Under the terms of the proposed agreement, NASDA will take the lead in coordinating with other relevant agencies in Japan to obtain and process information of interest to NASA - primarily technical reports, monographs, and other "grey" literature not

readily available through conventional sources. In return, the Japanese government will be given commercial access to the aerospace database.[29/]

NASA has produced three bibliographies of Japanese - source material since 1984. The most recent - "Japanese Science and Technology - a Bibliography with Indexes," available for government use only because of copyright restrictions was published in May of 1987. It contains references to over 3,000 items on Japanese aerospace and aeronautics-related technology acquired during 1986.

National Science Foundation (NSF)

The National Science Foundation plays an important role in increasing U.S. knowledge of Japanese developments in science and technology through programs carried out both independently and in cooperation with other organizations in Japan and the United States. One of the most significant, if not oldest, of these efforts is the U.S.-Japan Cooperative Science Program established in 1961 to facilitate the exchange of scientists between the U.S. and Japan. During April 1986 to March 1987, 419 American scientists were sent to Japan and 645 Japanese scientists came to the U.S. under this program's auspices. The results of the research conducted by participating scientists is often published in scientific journals.[30/]

The Foundation has an office in Tokyo which functions as ombudsman for visiting U.S. scientists and liaison for other U.S. - Japan programs. The office prepares Tokyo Office Reports of high quality covering significant Japanese technical developments which are available on request from the Washington office.

Starting in Fiscal Year 1988 the NSF Division of International Programs will begin a series of initiatives aimed at increasing access to Japanese information on science and technology. These include: training U.S. scientists and engineers in the Japanese language, increasing the flow of U.S. researchers to Japan to collect relevant scientific and technical information, and increasing the number of U.S. investigators working in Japanese laboratories.[31/]

In the language training area, NSF cosponsored a conference with the Massachusetts Institute of Technology in November 1987 on training technical students in Japanese. NSF may fund the development of specialized teaching materials based on the conference outcome and the results of a survey of Japanese language instruction at U.S. universities. In addition, the Foundation may make fellowships available to graduate students in science and engineering for Japanese language study.

Finally, negotiations are underway with the Japanese Ministry of Education (Monbusho) to obtain language training assistance for U.S. scientists doing work in Japan on a long-term basis.

NSF hopes to increase technical reporting from Japan by sending survey teams of U.S. researchers to government and private laboratories and by encouraging attendance of American scientists at Japanese conferences and seminars. Ideally, the observations and knowledge obtained from these visits will be disseminated via an electronic bulletin board (J-NEWS) being developed in cooperation with George Mason Institute. Accessible through the ARPANET system, an prototype was developed in September 1987, and plans are to make it available for national use in early 1988.

As a final component of these new initiatives, the Foundation will increase the capabilities of its Tokyo office by adding an additional staff member to serve as ombudsman to visiting U.S. scientists and engineers. This person will assist in such logistical matters as housing and transportation, and also be on the lookout for research opportunities in Japan.

Nuclear Regulatory Commission

The Nuclear Regulatory Commission maintains about eight bilateral science and technology agreements with Japan which provide for joint projects and information exchange on nuclear safety issues. In 1985, the Commission implemented an agreement with Japan specifically for information exchange.

Under the terms of this agreement, the Commission exchanges literature on a quid pro quo basis with the Ministry for International Trade and Industry (MITI) and the Science and Technology Agency. Most of the information obtained from the Japanese is in the form of technical reports with English titles and summaries.

The Commission's Research Division issues biweekly announcements to its technical staff notifying them of Japanese and other foreign acquisitions available for review in the NRC library. The volume of the Japanese material received is so heavy as to make screening and analysis of the reports received nearly impossible. Thus, aside from keeping appropriate personnel informed of availability, the Commission is unable to make any meaningful assessment of the value and utility of the Japanese information obtained.[32/]

QUASI-GOVERNMENTAL AGENCIES

National Academy of Science

The Academy, through the National Research Council, has made a number of Japan-related studies in the last year, although it has no specific programs in place for Japanese literature acquisition. Recently, the Academy established an Office of Japan which will be fully staffed next year. This office will take the lead in developing discussions on "symmetrical access" to information on Japanese science and technology initiated in 1985. Over the last several years the Academy sponsored several meetings on this issue which were attended by representatives of U.S. and Japan high technology-related industry, government, and academia. Based on these discussions the office may work with the Japan Society for the Promotion of Science and other groups to sponsor a series of technical briefings in Japan for U.S. scientists.

56

CONCLUSION

To be most effective, Japanese scientific and technical literature acquisition must be part of a nationwide effort to stay abreast of Japanese scientific and technological trends. This must be a multi-faceted effort at the Federal and private sector levels comprised of Japanese language training for scientists and engineers, scientific exchange, and utilization of currently available resources for information on Japanese science and technology available in the United States.

Federal government Japanese literature acquisition efforts are often the fragmented result of a few scientific exchange agreements or the initiative of a few individuals. Established foreign technology acquisition programs such as the Department of Energy's Office of Scientific and Technical Information and the Department of Commerce National Technical Information Service are sometimes unfocused and passively reliant on their Japanese information suppliers. The sheer volume of information coming out of Japan (there are over 10,000 scientific journals alone) and a lack of feedback from users are contributing factors.

Before these deficiencies can be fairly addressed, however, currently available Federal resources for information on Japanese science and technology must be better utilized. This

report confirms the existence of a plentiful supply of information. Establishment of the Office of Japanese Technical Literature marks the beginning of a concerted effort to coordinate these resources more effectively and make them known to the public. Based on these efforts, the Office of Japanese Technical Literature looks forward to further development of targeted and comprehensive activities for Japanese technical literature acquisition carried out in tandem with users.

APPENDIX 1

List of Sources for Japan Acquisitions
National Technical Information Service

Agency of Industrial Science and Technology (AIST)
Ministry of International Trade and Industry
Reports and Technical Bulletins from:

* National Research Laboratory of Metrology
* Mechanical Engineering Laboratory
* National Chemical Library for Industry
* Fermentation Research Institute
* Research Institute for Polymers and Textiles
* Geological Survey of Japan
* Electrotechnical Laboratory
* Industrial Products Research Institute
* National Research Institute for Pollution and Resources
* Government Industrial Research Institute (GIRI) Osaka
  Reports and Bulletins
* GIRI Nagoya, Kyushu, Shikoku, Tohoku, and Chugoku
  Reports and Bulletins
* Government Industrial Development Laboratory, Hokkaido
  Reports and Bulletins

Science and Technology Agency
Office of the Prime Minister
Reports and Bulletins from:

* National Aerospace Laboratory
* National Research Institute for Metals
* National Institute of Radiological Sciences

* National Research Center for Disaster Prevention

* National Institute for Research in Inorganic Materials

* National Institute of Resources

+ Radio Research Laboratories, Ministry of Posts and Telecommunications

+ Public Works Research Institute, Ministry of Construction

+ Ministry of Transport

  * Ship Research Institute
  * Electronic Navigation Research Institute
  * Port and Harbor Research Institute

+ Japan Information Center for Science and Technology (JICST) abstracts and lists of ongoing research projects

+ Japan Industrial Technology Association (JITA) papers and reports, periodicals, etc.

+ Research Development Corporation of Japan

+ Japan Maritime Science and Technology Center

+ Railway Technical Research Institute

+ Faculty of Engineering, Tokyo University

+ Faculty of Information Technology, University of Tsukuba

+ Kajima Construction Corporation

+ Taisei Corporation

+ Nippon Steel Corporation

+ Nippon Kokan K.K.

+ Kawasaki Steel Corporation
+ Sumitomo Steel Corporation
+ Kobe Steel Corporation
+ Nisshin Steel Corporation
+ Mitsubishi Heavy Industries, Ltd.
+ Mitsubishi Electric Corporation
+ Ishikawajima-Harima Heavy Industries Co., Ltd.
+ Mitsubishi Cable and Wire Corporation
+ Toshiba Corporation
+ NEC Corporation
+ Asahi Glass Co.
+ Asahi Glass Foundation for Industrial Technology
+ Mitsubishi Chemical Industries, Ltd.
+ Fuji Electric Co., Ltd.
+ Research and Development Association for future Electron Devices
+ Toyota Motor Corporation
+ Fujitsu, Ltd.
+ Osaka Municipal Government
+ AGNE Technical Center, Inc.
+ Advanced Robot Technology Research Association
+ Matsushita Electric Industrial Co., Ltd.

APPENDIX 2

Japanese Unexamined Applications for 1984-1986

Series	1984	1985	1986	Total	% OF GT
C	30566	33567	38066	102199	18.85
P	43191	51676	59650	154517	28.50
M	44446	50402	55640	150488	27.76
E	37560	45071	52328	134959	24.89
GT	155763	180716	205684	542163	
ISS	233100	264400	297200	794700	
#NA	77337	83684	91516	252537	
%NA	33.18	31.65	30.79	31.78	

KEY

C = CHEMICAL
P = PHYSCIAL
M = MECHANICAL, GENERAL
E = ELECTRICAL
GT = GRAND TOTAL OF ABSTRACTS
ISS = NUMBER OF APPLICATIONS ISSUED
#NA = NUMBER NOT ABSTRACTED
%NA = PERCENT NOT ABSTRACTED

Source: JAPIO Abstracts

APPENDIX 3

JTECH Reports

	Topic	Date
1.	Computer Science	December, 1984
2.	Mechatronics (Robotics)	May, 1985
3.	Non-Silicon Micro and Opto Electronics	August, 1985
4.	Biotechnology	August, 1985
5.	Advanced Materials (Polymers)	May, 1986
6.	Telecommunications	May, 1986
7.	Advanced Computation	May, 1986

APPENDIX 4

U.S. Conferences and Hearings on Access
to Information on Japanese Science and Technology

Title/Topic	Date	Sponsor(s)	Report Available
1st Symposium on U.S.-Japanese Science and Technology Exchange	October 1981	Japan-American Society of Washington, DC	X
Workshop on Japanese Scientific & Technical Information in the U.S.	January 1983	MIT Japan Science and Technology Program/National Technical Information Service	X
The Availability of Japanese Scientific and Technical Information in the United States	March 1984	U.S. House of Representatives (Hearings-Committee on Science and Technology)	X
Getting America Ready for Japanese Science and Technology	February 1985	MIT Japan Science and Technology Program/Wilson Center	X
The Role of Technical Information in U.S. Competitiveness with Japan	June 1985	U.S. House of Representatives (Hearings-Committee on Science and Technology)	X
U.S. Access to Japanese Technical Literature: Electronics and Electrical Engineering	June 1985	National Bureau of Standards/IEEE	X
High Level Meeting on High Technology in the International Environment	Spring 1985	National Academy of Science/Japan Society for the Promotion of Science	
Monitoring Foreign Science and Technology	October 1986	Office of Naval Research/National Science Foundation	X

Title/Topic	Date	Sponsor(s)	Report Available
2nd Symposium on U.S.-Japanese Science and Technology Exchange	November 1986	Japan-America Society of Washington, DC	X
High Level Meeting on High Technology in the International Environment	November 1986	National Academy of Science/Japan Society for the Promotion of Science	
International Conference on Japanese Information	September 1987	National Technical Information Service/ British Library	X
Technical Japanese Language for Scientists and Engineers: Curricular Options	November 1987	MIT Japan Science and Technology Program/National Science Foundation	X

APPENDIX 5

MACHINE TRANSLATION

Development of a fast and accurate machine translation system would be a boon towards increasing the availability of Japanese technical literature in the United States given the scarcity of qualified translators and high costs associated with manual translation. The 1987 "Directory of Japanese Technical Resources" identifies about 120 commercial translating services in the United States, and an oft-quoted, but little substantiated survey a few years ago indicated the existence of only about 400 "competent" translators in the U.S. Even if these translators were to translate at the highly productive rate of two ten page documents per month, the output would be only 9600 translations per year - not very high considering current interest in Japanese science and technology.

Increasing the availability of manual translations is exacerbated by slowness, and above all, high costs, which can easily run as high as $100 per page for technical material. Another awesome task given the scarcity of translators, is the necessity to screen large volumes of material in order to identify specific documents worth translating. Machine translation could greatly assist in this process. It would also ensure uniformity of output

and be more easily adaptable to electronic forms of communication.

At present U.S. government efforts to develop Japanese-English machine translation are limited to a project underway by the Air Force Foreign Technology Division and the Intelligence Community. This project was formally initiated in 1985 following several years of planning and consideration of various machine translation options available in the United States and Japan.

The Intelligence Community chose to support research and development of a Japanese-English Systran System (JESS), based in part on the successful development of a Russian-English Systran system. Developed by a private firm under the sponsorship of the Air Force in the 1950s, the Russian-English System now boasts an accuracy rate of over 90%. Systran is a language-independent automatic translation system theoretically capable of handling any language pair through the use of a specially designed computer-based dictionary. Based on the success of the Russian-English system and other assessments, the Intelligence Community decided that Systran offered the most potential for a fast and accurate Japanese-English system. An additional factor in Systran's favor was the

fact that a Japanese firm called "IONA" had already invested considerable resources in developing a basic Japanese-English system. This work was accomplished under contract with World Translation Center (WTC), the developer of Russian-English and other Systran pairs.

In December of 1985, the Air Force concluded a licensing agreement with IONA and LATSEC (government branch of WTC) which gave the U.S. Government access to work on JESS concluded to date and unlimited rights for use of the system within the government following production. Under the terms of the agreement, LATSEC/IONA maintains the exclusive worldwide rights to JESS including title, ownership, and computer software documentation. LATSEC/IONA also retains the rights to all improvements and modifications made to the system by the Air Force except for certain confidential dictionary material. The agreement further stipulates that U.S. government use of the system to perform translations outside of the Air Force is limited to the Foreign Broadcast Information Service (FBIS), the U.S. Patent Office, and the National Technical Information Service (NTIS). FBIS may use the system to translate newspaper, magazine, and journal articles for public use and the Patent Office may use it for patent translations. NTIS use is restricted to public

dissemination of copies of translated material obtained via FBIS and the Patent Office.[34]/

U.S. Government-sponsored work on JESS officially began in early 1986. Since then considerable dictionary work has been done, necessary inputting hardware acquired, and some linguistic work accomplished. The Intelligence Community hopes to have a prototype available in late 1988 to mid 1989.[35]/

At present the JESS contractor LATSEC, describes the system as "basic", giving it a 67% accuracy rate based on its in-house quality analysis. According to LATSEC, most Systran language pairs fall within the accuracy range of 85-95%, with 80% considered the minimal requirement for good readability. Raising the Japanese-English system to this level will probably require another 2 to 3 years of effort, with an additional 2 to 3 years needed to raise the level to 90% and above. Funding requirements are estimated at $500,000 per year over the next three years.[36]/

Assuming no funding constraints or other unforseen problems, Japanese-English Systran appears to hold promise. However, an independent evaluation should be

conducted to compare its potential with other systems under development in Japan. Past success with Systran European language pairs is reassuring, but the unique problems inherent in Japanese to English translation present a challenge of quite a different magnitude for any machine translation system. Furthermore, the current terms of the licensing agreement specify that even if Japanese-English Systran reaches production, its use will be fairly restricted within the government and unavailable to the private sector other than through the limited channels noted earlier. Benefits to the Foreign Broadcast Information Service will be the most substantial, since machine translation would greatly facilitate processing of the high volume of material which it must acquire, screen, and translate.

Maximum benefits from this or any other Japanese-English system will not be realized until Optical Character Reading (OCR) capability is made widely available. As currently designed, Japanese-English Systran requires text input through the use of a Japanese character keyboard - making it all but impossible for those with no Japanese-language capability to utilize the system. OCR capability is an established technology in Japan, but commercially available OCR for use in machine translation

is slow in coming. Recently, however, Fuji Electric Co., Ricoh, and Sanyo have announced commercial OCR, and a prototype system combining OCR with machine translation has been reported by Oki Electric Co.

In Japan, numerous well-known companies including Oki, Fujitsu, Hitachi, NEC, Sanyo, Sharp, Toshiba, and Mitsubishi have been developing commercial machine translation systems designed for use in translating technical manuals for overseas markets and other internal business purposes. Several are already marketing machine translation software on magnetic disks for the equivalent of $4,000 to $6,000. Most of these systems have an accuracy rate of 70-80% depending on the difficulty of the source document.[37/]

FOOTNOTES

1. David Shonyo, NTIS Office of International Affairs, personal communication, September 14, 1987

2. The directory can be purchased by the public for $36.00 (Order Number PB87-205258).

3. Paul T. Feinstein, NTIS Office of International Affairs, personal communication.

4. Ildiko Nowak, National Translation Center, personal communication.

5. Most Japanese translations provided to NTC originate from a fairly limited number of publishers in Japan, making it feasible to negotiate blanket releases.

6. Joseph F. Caponio, Director, National Technical Information Service, report to Under Secretary for Economic Affairs Dr. Robert Ortner, August 2, 1987.

7. Don Peterson for Donald J. Quigg, Assistant Secretary and Commissioner of Patents and Trademarks, report to Under Secretary for Economic Affairs Robert Ortner, August 20, 1987.

8. ibid.

9. Ernest Ambler, NBS, Director, report to Under Secretary for Economic Affairs Robert Ortner, August 25, 1987.

10. U.S. Department of Commerce, National Bureau of Standards, Maureen Breitenberg, Functions of the NBS Associate Director for Industry and Standards, August 1987, pages 1-3.

11. Dr. Robert Wildman, NOAA, personal communication, November 10, 1987.

12. Jurate Micuta, NOAA, Language Services Branch, personal communication, November 10, 1987.

13. Jeff MaClure, NESDIS, personal communication, November 6, 1987.

14. This survey was conducted by a J-TECH contractor, Dr. Duane Shelton of Loyola College in Maryland.

15. Emily Arakaki, International Trade Administration, personal communication.

16. Dr. Joe Luguire, DARPA, personal communication, December 8, 1987.

17. Dr. Jim Canfield, Air Force Foreign Technology Division, personal communication, November 11, 1987.

18. John Erols, Foreign Science and Technology Center, personal communication, November 5, 1987.

19. Dr. Tamami Kusuda, Office of Japanese Technical Literature, Japan trip report, July 1987.

20. Charles Stuber, DOE Office of Scientific and Technical Information, personal communication, November 4, 1987.

21. Dr. Michael Roberts, DOE Office of Fusion Research, "Executive Summary of U.S.-Japan Fusion Activities," August 5, 1987.

22. ibid.

23. DOE Office of Conservation, International Research Monitoring Multi-Year Plan, September 1987.

24. Dr. Richard Hsieh, National Library of Medicine, personal communication, December 18, 1987.

25. Fact sheet, FBIS.

26. Paul T. Feinstein, National Technical Information Service, personal communication, November 9, 1987.

27. Fact Sheet, American Institute of Aeronautics and Astronautics, Technical Information Service.

28. Virginia N. Anderson, "Search the Engineering Databases," Database Magazine, April 1987.

29. Philip Thibadeau, NASA, personal communication, November 10, 1987.

30. Charles W. Wallace, NSF, personal communication, August 25, 1987.

31. Charles W. Wallace, "Activity of the United States National Science Foundation in Gaining Access to Japanese Scientific and Technological Information," paper presented at the International Conference on Japanese Information in Science, Technology, and Commerce, University of Warwick, England, September 1-4, 1987.

32. Jose' Cortez, NRC Research Division, personal communication, November 6, 1987.

33. Hisako Halasz, Library of Congress Science Division, personal communication, November 2, 1987.

34. License Agreement between USG, LATSEC, and IONA, December 17, 1987, pages 1-3.

35. George W. Rogers, Jr., Vice Chairman/IHC/IHS, personal communication, November 9, 1987.

36. ibid.

37. Dr. Tamami Kusuda, trip report on Machine Translation Summit, Hakone, Japan, September 13-20, 1987.